



AGRICULTURAL RESEARCH INSTITUTE
PUSA

DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
PUBLICATIONS BRANCH

Vol, 9: No. 1

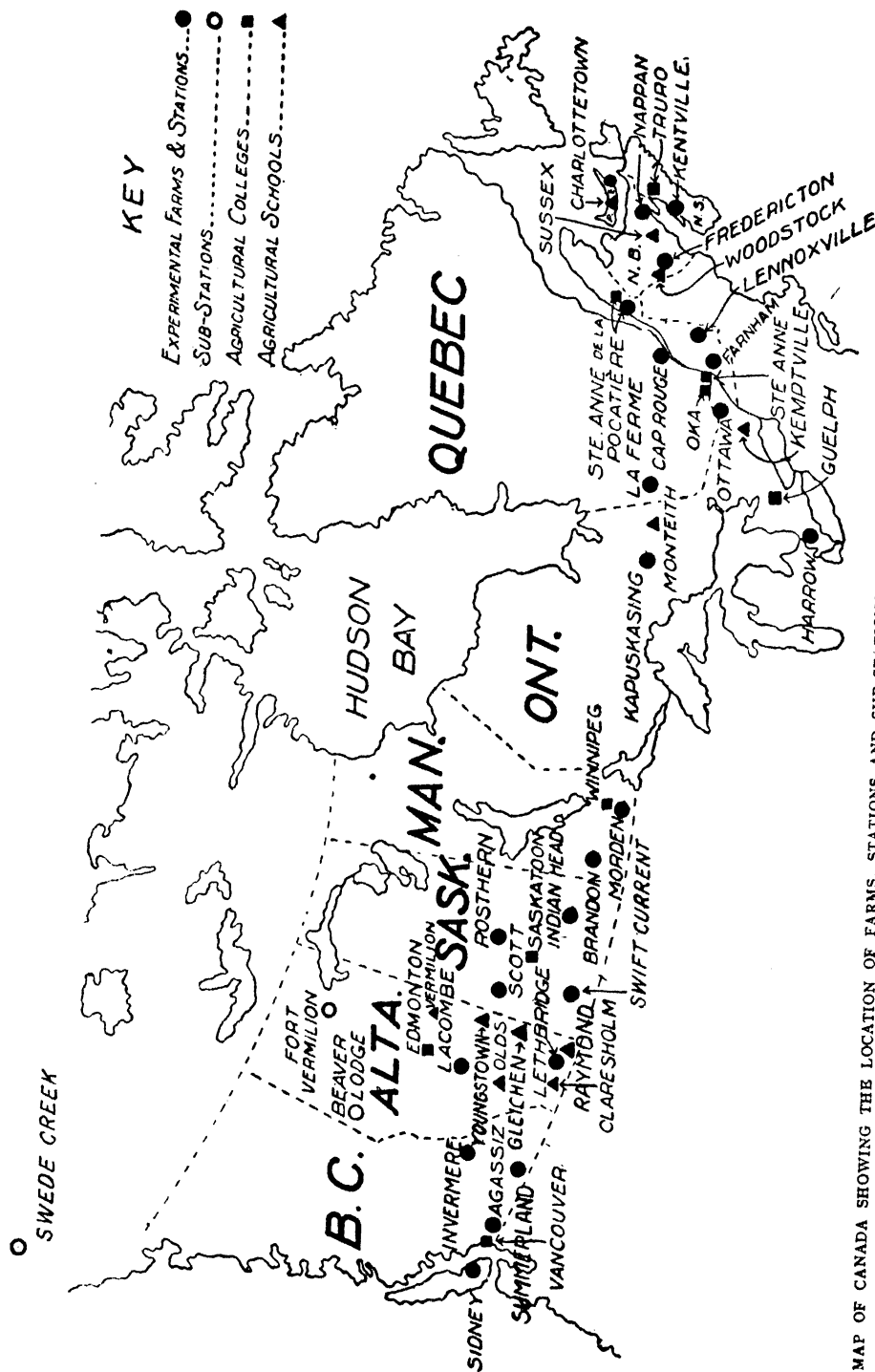
January-February, 1922

The AGRICULTURAL GAZETTE
OF CANADA

J. B. SPENCER, Director of Publicity

Wm. B. VARLEY, Editor (Acting)

Issued by authority of the Honourable W. R. Motherwell, Minister of Agriculture
OTTAWA



MAP OF CANADA SHOWING THE LOCATION OF FARMS, STATIONS AND SUB-STATIONS IN THE EXPERIMENTAL FARMS SYSTEM, THE AGRICULTURAL COLLEGES AND AGRICULTURAL SCHOOLS

CONTENTS

PART I.

DOMINION DEPARTMENT OF AGRICULTURE

	PAGE
THE DOMINION EXPERIMENTAL FARMS:	
THE DOMINION EXPERIMENTAL FARMS BRANCH, ITS HISTORY AND DEVELOPMENT.....	5
NITRO-CULTURES AND THEIR DISTRIBUTION, by R. A. Inglis, B.A., Junior Botanist, Central Experimental Farm.....	14
A NATIONAL SWINE POLICY.....	18
POULTRY DISEASE RESEARCH, by A. B. Wickware, V.S., Animal Pathologist, Health of Animals Branch.....	19
THE INTERNATIONAL SEED CONTROL CONGRESS, by George H. Clark, B.S.A., Commissioner, Seed Branch.....	21
THE EUROPEAN CORN BORER IN SOUTHERN ONTARIO, by Leonard S. McLaine, Entomological Branch.....	22
COMMERCIAL FERTILIZER ADMINISTRATION.....	25
THE HONOURABLE W. R. MOTHERWELL, MINISTER OF AGRICULTURE.....	25

PART II

PROVINCIAL DEPARTMENTS OF AGRICULTURE

ONTARIO'S WORK UNDER THE AGRICULTURAL INSTRUCTION ACT, by W. Bert Roadhouse, Deputy Minister of Agriculture.....	26
THE ORIGIN, ACTIVITIES AND POSSIBILITIES OF WOMEN'S INSTITUTES IN ONTARIO, by George A. Putnam, Superintendent.....	30
ALBERTA WOMEN'S INSTITUTE GIRLS' CLUBS.....	34
INVESTIGATION OF MAPLE SAP PRODUCTS, by Professor J. F. Snell, Macdonald College.....	35
SHEEP IMPROVEMENT MEASURES IN ONTARIO.....	37
GRADING OF PUREBRED RAMS—NOVA SCOTIA.....	37

PART III

AGRICULTURAL EDUCATION AND RELATED ACTIVITIES

THE SCHOOL IN THE RURAL COMMUNITY, by G. V. Van Tausk, M.A., B.Sc., (Oxon), B.S.A.....	38
SCHOOL AND HOME PROJECTS AND SCHOOL FAIRS, 1921:	
ONTARIO, by Dr. J. B. Dandeno.....	41
NOVA SCOTIA, by L. A. DeWolfe, B.A., M.Sc.....	42
NEW BRUNSWICK.....	43
SASKATCHEWAN SCHOOL EXHIBITIONS, by Fred W. Bates, B.A., M.Sc.....	43
SASKATCHEWAN BOYS' AND GIRLS' CLUBS, by Harry Saville, B.S.A.....	44
ALBERTA SCHOOL FAIRS.....	44
SCHOOLS OF AGRICULTURE AND DOMESTIC SCIENCE FOR ONTARIO, by L. Stevenson, B.S.A.....	45
AGRICULTURAL COLLEGE ENROLMENT, 1921-22.....	47

PART IV

SPECIAL CONTRIBUTIONS, REPORTS OF AGRICULTURAL ORGANIZATIONS, PUBLICATIONS AND NOTES

	PAGE
FOREST PROTECTION AND TREE PLANTING.....	49
NEWS ITEMS AND NOTES.....	50
ASSOCIATIONS AND SOCIETIES.....	54
APPOINTMENTS AND STAFF CHANGES.....	54
THE LIBRARY.....	55
NEW PUBLICATIONS.....	57

PART V

THE INTERNATIONAL INSTITUTE OF AGRICULTURE

FOREIGN AGRICULTURAL INTELLIGENCE--

Crops and Cultivation.....	59
Farm Engineering.....	64
Rural Economics.....	65
Agricultural Industries.....	66
Plant Diseases.....	66
Injurious Insects.....	69
THE INTERNATIONAL REVIEW OF AGRICULTURAL ECONOMICS.....	71
AGRICULTURAL STATISTICS.....	72

The AGRICULTURAL GAZETTE

OF CANADA

VOL. IX

JANUARY-FEBRUARY, 1922

No. 1

THE DOMINION EXPERIMENTAL FARMS

DURING the year now being entered upon, it is the intention to publish in *The Agricultural Gazette* a series of articles describing a number of the leading Farms and Stations in the Dominion Experimental Farms System. The series begins in this issue with a review of the System and an account of the organization and functions of the Central Farm, Ottawa, whence the work of the System is directed. Six other Farms of varying type will be described in succeeding issues. Beginning in the East with the Experimental Station, Charlottetown, P.E.I., and concluding with the Station at Summerland, B.C., each will represent a section of the Dominion differing physically and climatically from other sections, and presenting problems on the solution of which successful farming in the region served largely depends.—*Editor.*

THE DOMINION EXPERIMENTAL FARMS BRANCH ITS HISTORY AND DEVELOPMENT

THE preliminary investigations leading to the establishment of the Experimental Farms Branch of the Department of Agriculture began in 1884, when a select committee of the House of Commons was appointed to inquire into the best means of encouraging and developing Canadian agriculture. As a result, Dr. William Saunders of London, Ont., was instructed, late in 1885, to visit experimental stations in the United States and European countries with a view to formulating a policy for Canada. Following his report to the then Minister of Agriculture, Sir John Carling, an Act was passed providing for the establishment of an Experimental Farm for the Provinces of Ontario and Quebec jointly,—this Farm to be known as the Central Farm—together with one for the Maritime Provinces, one for the Province of Manitoba, one for the Northwest Territories, and one for British Columbia. The Act cited the main lines of investigation to be pursued. These included live stock breeding, dairying, the testing of cereals and other field crops, grasses and forage plants, fruits, vegetables, trees, and plants; the study of seeds, fertilizers, plant diseases and insect pests, the investigation of diseases of domestic animals, and such other experiments or researches as might benefit agriculture. Within two years of the passing of this Act, the five farms had been selected, and were in practical operation. They were: The Central Farm at Ottawa, and the Farms at Nappan, N.S., Brandon, Man., Indian Head, N.W.T., and Agassiz, B.C.

THE AGRICULTURAL GAZETTE OF CANADA

In the light of subsequent increases in the staff and development of the work, the Experimental Farms System commenced with a very limited personnel, consisting of the Director, Dr. Saunders, and the officers in charge of the Divisions of Entomology and Botany, Chemistry and Horticulture. The work during the early years of the Farm's history also strikes the present observer as very limited in scope and simple in character. To us much of it may seem like the demonstration of the obvious. This feeling is perhaps as high a compliment as can be paid to the work of the Experimental Farms during the last thirty-five (35) years. We do not understand the condition of Canadian agriculture when the Farms were established. We do not realize that in those days the value of good seed and suitable varieties was not understood, that systematic rotations were very little followed, that good cultural methods were neither studied nor practised, that the use of fertilizers was not fairly understood or systematically followed, that the advantages of surface tillage to preserve soil moisture on one hand, and of underdrainage on the other, had not been brought to the attention of the farmer, that the uses of leguminous plants to increase soil fertility were unknown, that the necessity of careful breeding, feeding, housing, and management of live stock was not recognized,—or in short that agricultural education and practice in the Dominion were in their infancy. When these facts are realized, it will be readily understood how necessary it was that the simple yet fundamentally essential elements leading towards agricultural stimulation should be studied and the results made known as widely as possible. The comparatively advanced state of Canadian agriculture and Canadian agricultural investigations as we have them to-day, is largely due to the patient work upon simple basic problems, as carried on by the pioneer agricultural investigators of the Experimental Farms System, work

built upon a solid and enduring basis and expanded by them and by their successors according to a well thought out plan, as the higher agricultural standards and growing needs of the Dominion have demanded.

Dr. William Saunders remained Director of the System until March 31, 1911, retiring on account of old age and ill health. On that date the number of Experimental Farms and Stations had increased to nine, and the number of divisions of the work at the Central Farm to seven. He was succeeded as Director by Mr. (later Dr.) J. H. Grisdale, who had been Agriculturist at the Central Farm for some years.

The year 1911 marked the beginning of a rapid transition from the early system of development of the Farm, one of slow and gradual expansion, in favour of a policy of establishing additional experimental stations, of incepting much wider experimental work and of entering upon new fields of agricultural investigation. This change was made necessary by the very rapid settlement of Western Canada, and by the increased attention being paid to agricultural investigation and effort on the part of various institutions throughout Canada and other countries. The farmers of Canada had shown themselves quick to take advantage of the earlier work for their benefit, and it was imperative that agricultural problems should be more deeply and widely studied if the prosperity of the farming community was to continue. During Dr. Grisdale's régime as Director, therefore, several new divisions of the work were established at the Central Farm and other divisions were sub-divided, while the number of Experimental Farms was increased from nine to twenty.

When Dr. Grisdale left the position of Director in March, 1920, to take the higher post of Deputy Minister of the Department of Agriculture, he was succeeded by Mr. E. S. Archibald, B.A., B.S.A., who had served as Dominion Animal Husbandman under Dr. Gris-

dale for several years, and for nearly a year had been Acting Director of Experimental Farms in addition.

Since that time war and post-war conditions have not permitted the opening up of new Branch Farms as rapidly as heretofore, only one more Farm having been established, namely at Swift Current, Sask. The main efforts of the present Director and his staff have been devoted to systematizing and broadening the various lines of experimental work, and the equipping of the newer branch Farms for carrying on full lines of investigation,—a huge task which is by no means completed. At the present time, some 2,745 main experimental projects are being studied on the various Farms and most of these include a number of sub-projects.

Accompanying the increase in the number of Farms and the widening of experimental work carried on, there has necessarily been a very large increase in the staff of the Branch. From the dozen or so devoted experimentalists who commenced work in 1886, the technical staff has increased until upon the Central Farm alone there are at the present time nearly fifty engaged upon the various investigations and experiments, while under them a large number of trained and skilled workers of various classes are employed. Upon the Branch Farms it has been found necessary to appoint assistants to most of the superintendents, and even with this large increase throughout the System, it is difficult to cope with the work.

Status and Scope of the Experimental Farms Branch

The Experimental Farms Branch comprises the Central Experimental Farm at Ottawa, twenty-one Branch Farms and Stations, two Tobacco Experimental Stations, and eight Experimental Sub-Stations.

The Branch Experimental Farms and Stations are as follows: Charlottetown, P.E.I.; Nappan, N.S.; Kentville, N.S.; Fredericton, N.B.; Cap Rouge, Que.;

Lennoxville, Que.; Ste. Anne de la Pocatière, Que.; La Ferme, Que.; Kapuskasing, Ont.; Morden, Man.; Brandon, Man.; Scott, Sask; Swift Current, Sask.; Rosthern, Sask; Indian Head, Sask.; Lethbridge, Alta.; Lacombe, Alta.; Agassiz, B.C.; Summerland, B.C.; Sidney, B.C.; Invermere, B.C. The Tobacco Stations are located at Farnham, Que., and Harrow, Ont. The Experimental Sub-Stations are located in the thinly settled districts of Northern Alberta, the Northwest Territories, and the Province of Quebec, and are conducted with the view to ascertain the northern limits of agricultural production in the Dominion. These Sub-Stations are located as follows: Beaverlodge, Alta.; Fort Vermilion, Alta.; Grouard, Alta.; Fort Providence, N.W.T.; Fort Smith, N.W.T.; Fort Resolution, N.W.T.; Salmon Arm, B.C.; Swede Creek, Y.T.; and Bertsiamitis, Que.

As a connecting link between the Experimental Farms and the farmers of Canada, there has been established a system of Illustration Stations, where outstanding results of experiment are demonstrated on farms owned and operated by individual farmers, as hereinafter described.

At the Central Farm, Ottawa, the headquarters of the System, are located the office of the Director, as general administrative officer, and thirteen Divisions, each under the immediate control and supervision of a divisional chief. The Divisions are as follows: Animal Husbandry, Field Husbandry, Horticulture, Cereals, Forage Plants, Poultry, Bees, Tobacco, Economic Fibre Production, Chemistry, Botany, Illustration Stations, and Extension and Publicity.

In these Divisions originate the preliminary work of research and experiment, which is afterwards extended in its more practical aspects to the Branch Farms and Stations. The results of the work throughout the system in any particular line are collated at Ottawa and made public.

Division of Animal Husbandry

In 1912, the Agriculturist's Division, which had been in existence since the inception of the Farms System, was subdivided into the Division of Animal Husbandry and the Division of Field Husbandry. Livestock breeding, feeding, housing, and management had been one of the principal studies from the beginning. This work had been characterized by marked success, especially during the period 1895 to 1912, when wide experimental work was carried on in the study of methods of feeding for beef. Among the results was the establishing of standard livestock feeds from what had previously been regarded practically as waste products. The improvement of flocks and herds was also greatly stimulated by the importation and distribution of high class breeding stock of all classes of farm animals.

Among the more important investigations now being conducted are the steer-feeding experiments of which the following are typical: Feeding Steers of Beef Type vs. Scrubs; Cost of Winter Feeding; Long vs. Short Keep; Feeding Loose vs. Tied; Outside vs. Inside Feeding; Feeding Roots vs. Ensilage; Central Work with Steer Feeding; Most Economical Roughages; Value of Condiments, Value of Home-grown Grains vs. Mill Feeds; Winter and Summer Feeding; and Breeding Work with Beef Cattle.

Breeding work with beef cattle is being carried on at the Experimental Station at Lacombe, Alta., with the Aberdeen Angus breed, and at Nappan, Lennoxville and Indian Head with Shorthorns. Kentville, Fredericton and Brandon feature the development of a good milking strain of a dual purpose type, the Shorthorn being used in this work.

The work with dairy cattle is very extensive and detailed, comprising the comparison of dairy breeds, grading-up experiments, and feeding studies. Practical work is being conducted in selling

milk, butter, cream, or cheese. Several different kinds of cheese are manufactured. Milking machines of different makes have been given a thorough test.

With horses, breeding experiments are being carried on at a number of Branch Farms with Clydes and Percherons, and in connection with the Experimental Station at Cap Rouge, Que., a special horse farm has been established where attention is being given to the breeding of French Canadian horses. Many experiments are carried on from year to year in the economical feeding and management of work horses and the cheap wintering and housing of the same.

With sheep, comparison of breeds is being carried on throughout the system, and at one or two of the Stations in the West, the raising of sheep under range conditions is conducted.

Experiments in swine feeding and breeding constitute one of the main features of the work of the division.

Division of Field Husbandry

As part of the Agriculturist's division, Field Husbandry work has been prominent throughout the system since its inception. In the sixteen years previous to the establishment of a separate division in 1912, the work done had greatly modified for the better farm practices in many parts of Canada. Among the many benefits resulting had been the introduction of a system of summer fallowing in Western Canada, the development of new and superior rotation systems, the introduction of new types of crops, and of superior varieties of seed.

Much of the work of this division may be defined as the practical application or test under field conditions of the results obtained by some of the other divisions more directly engaged in scientific research. However, many new lines of work of great importance are also under way, such as comparative tests of commercial fertilizers; study of

farm drainage; study of rotations; cultural experimental work; studies in farm management; comparative tests of various types and makes of farm machinery; cost of various farming operations.

Division of Horticulture

The work of the Division of Horticulture falls into four subdivisions, namely, vegetable gardening, orcharding and small fruits, ornamental gardening, and plant breeding. The work in vegetable gardening covers not only the testing of varieties but also experiments in cultural methods. With tree and bush fruits, work is carried on with plums, apples, cherries, grapes, raspberries, strawberries, currants, and gooseberries. Experiments are also conducted as to the results from closely planted orchards; tests are made of orchard cover crops, and of inter-cropping with vegetables; irrigation experiments, and methods of pruning. At some of the Branch Farms, horticulture is made a special feature of the work, namely, at Kentville, N.S., at Morden, Man., where every effort is being made to evolve varieties hardy enough for use in the prairie provinces; at Summerland, B.C., where the production of horticultural crops under irrigation is the main feature of the work, and at Sidney, B.C., where climatic conditions permit of a very wide range of horticultural experiment.

In ornamental gardening, variety tests of annuals, perennials, trees, shrubs, and vines are carried on at all the farms to ascertain the suitability and hardiness of these for ornamental purposes. Landscape gardening is studied, also the use of home grown vs. imported flower seeds, and the production of bulbs has been undertaken at Sidney, B.C. The work also comprises experiments with forest belts for the protection of homesteads, especially in the prairie provinces.

Extensive work in plant breeding is being carried on with the hope of improving existing varieties and originating new ones through cross-breeding. Greenhouse work is given special attention at Ottawa. Extensive spraying experiments are carried on throughout the system to test the value of different spraying materials and methods of application. Considerable work has also been done at Ottawa in the study of different methods of canning fruits and vegetables and the utilization of horticultural by-products.

The achievements in this division have been most marked. They include the origination of a large number of excellent varieties of bush and tree fruits, which are now widely and favourably known to the fruit grower and to the trade. The study and development of new varieties, of new cultural methods, of new rotational methods, suitable to the different soils and climates of Canada, have had a marked bearing upon horticultural advancement in Canada.

Division of Cereals

This division as well as some others was fortunate in having the special interest and guidance of Dr. Wm. Saunders in the early years. The work it has done in the originating of hardier and more productive varieties has been one of the outstanding successes of the Experimental Farms System. An example is Marquis wheat, which has so profoundly modified the production of that cereal in the Prairie Provinces, permitting the growing of excellent milling wheat in districts where formerly such a wheat was thought impossible.

The work of the Cereal Division comprises the production by cross-breeding and selection of new varieties of grains, and the testing of these as to their suitability for various parts of Canada. The latter part of the work is carried on at the branch Farms as well as at Ottawa, as is also the production of approved varieties on a larger scale to permit of

their general distribution. Notable successes in the production of new and improved sorts are the Marquis, Prelude, and Ruby wheats, the Arthur pea and the Liberty oat.

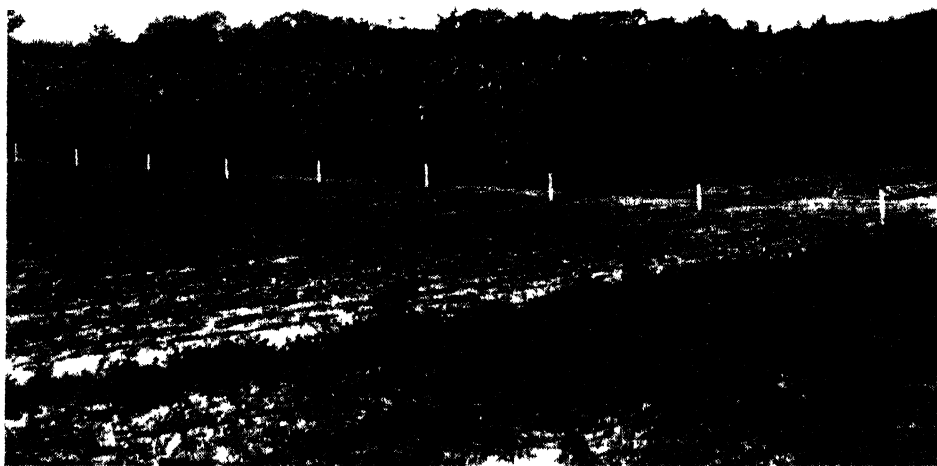
Merit tests of varieties already known, and of imported varieties, are conducted throughout the system. In order to reduce variations in results due to differences in soil and climate, these tests are conducted on duplicate plots on as many of the Farms as possible.

The Division of Forage Plants

The Division of Forage Plants was not established until 1912, although considerable work in the study of grasses and clovers had been done previous to that time in the Division of Botany. It

ent. Outstanding among its achievements are the organization of new and improved strains of Western Rye and other grasses, which promise greatly increased production over the present commercial sorts.

The Division has for its work variety testing of grasses, leguminous forage plants, field roots, and Indian corn; plant breeding with the same; the collection of Canadian wild flora, giving special attention to genera and species likely to be of value as forage plants; investigating the possibilities and best methods of growing root seeds in different districts, and efforts are being made towards standardization of type in the various varieties of root seed now sold commercially. An interesting feature



Experiments with sunflowers as a forage crop—Dates and rates of seedings, varieties, etc. Central Experimental Farm

was felt that careful and comprehensive breeding work in forage plants had assumed such outstanding importance as to warrant the formation of a Division for that work alone. The collection of material in this Division is now probably the best to be found on this contin-

of recent work has been the experiments with sunflowers for ensilage to replace corn and other ensilage crops in the cool and dry areas of Canada. Much success has so far attended this work. One of the main objects in the plant breeding work with clovers and grasses is

the production of hardy strains with a view both of lessening winter-killing and of extending northward the area wherein such forage crops can be grown.

The Poultry Division

Until recent years, the work with poultry on the Experimental Farms System was limited to keeping of small flocks, such as might be expected upon the average farm, together with a limited amount of experimental work along the simpler lines of breeding, feeding, and housing. The increasing importance of the poultry-keeping industry in Canada led to the work of the Division being much extended during the last few years, both at Ottawa and at the Branch Farms, and the field of experiment and research has been greatly widened. Its main lines at present are as follows: the study of artificial incubation; poultry breeding; study of systems of brooding and methods of rearing; experiments in crossing breeds; the best methods of rearing late-hatched chicks; trap nesting; methods of increasing winter egg production; methods of obtaining maximum fertility; and feeding experiments. Some work is also being done in the rearing of turkeys, ducks, and geese.

The study of poultry diseases is carried on in co-operation with the Health of Animals Branch, and with the Division of Chemistry in the study of the many important economic problems connected with feeds, feeding, and incubation. Wide tests have been made with various styles of poultry houses, brooder houses, and colony houses, and blue prints and specifications of the styles found most suitable for the various parts of Canada are sent out to those asking for information.

A new and very popular feature of the work is the Egg-Laying Contest. These contests are now conducted at eight Branch Farms as well as at the Central Farm. They are intended to stimulate good poultry keeping, and to

serve as a basis for the registration of pure-bred poultry of productive strains. The poultry survey work, which is being conducted in an endeavour to get groups of farmers in various localities to keep accurate records of costs and returns, is giving gratifying results.

The Bee Division

Since the appointment of an Apiarist in 1912, the work of the Bee division has been greatly extended, and now includes breeding, feeding, manipulation of bees, and the study of bee products. In breeding, an attempt is being made to produce a strain of bees with a lessened tendency to swarm. The suitability of Italian, hybrid and black bees for certain localities and their disease resistant powers are matters of investigation; also methods of re-queening, feeding and wintering. A study of the wild bees of Canada is being made; also a collection of the honey plants of Canada with particulars as to their location and extent. The marketing of honey is being given attention.

The Tobacco Division

The Division, originally a separate branch of the Department of Agriculture, was transferred to the Experimental Farms Branch in 1912. Its work has had a marked, indeed almost a revolutionary effect, upon the development of the tobacco industry in Canada. This is particularly noticeable in the development of strains and varieties suitable for the production of cigar binders and fillers, which classes now comprise the bulk of the tobacco grown in the province of Quebec. The recommendations of the division based on studies of tobacco soils, fertilizers, cultural methods, methods of manipulating the crop and of combatting plant and insect diseases and pests, have been generally adopted by growers in the provinces of Quebec and Ontario.

In plant breeding, the work comprises the improvement of existing varieties

THE AGRICULTURAL GAZETTE OF CANADA

and the originating of new ones, including those resistant to rot, by selection and cross-breeding. Such matters as seed-bed and field diseases and pests, the reclaiming of "tobacco-sick" soils, methods of curing, and moisture and temperature conditions in the warehouse, are under investigation. A wide distribution of seed of the best varieties is made each year to applicants.

A complete analysis of the soils of the tobacco producing regions of Canada is under way. During the growing season, inspectors examine the tobacco fields of as many growers as possible, suggesting the best methods of culture and of com-

and also contributed largely towards the production of fibre flax in Canada for shipment to Ireland. The experimental work of the Division is directed towards determining what areas in Canada are suitable for fibre production; what varieties and strains of seed are best suited to different localities; the proper amount of seed to sow per acre; the right time to sow and harvest; and the use of fertilizer on fibre crops. Acre lots of flax have been grown in many districts and fibre of an excellent quality has been obtained therefrom. The Division is also studying hemp growing, although, so far, owing to the special conditions



Flax plots, Central Experimental Farm, Ottawa.

batting pests and diseases. Co-operative experiments in fertilizers for tobacco are giving excellent results in both Quebec and Ontario.

Division of Economic Fibre Production

This Division, formed in 1916, partly as an outcome of war demand for flax fibre, did a great deal towards stimulating the growth of this crop in Canada,

outlined, its efforts have been chiefly directed towards flax production.

The prime essential for successful flax growing is the invention of labour saving devices, such as flax pullers. With the co-operation and assistance of the Division, a successful flax puller is now on the market, as is also a deseeding machine, whereby the flax straw may be threshed and the seed secured without

damage to the fibre. An improved flax scutcher has also been imported from Ireland.

The Division was unfortunate last year in the destruction by fire of its flax mill at Ottawa. Arrangements have since been made to secure a commercial flax mill at Clinton, Ont., where a large area of flax has been sown under the supervision of the Division for experiment and demonstration.

Division of Chemistry

The Division of Chemistry, formed upon the inception of the Experimental Farms Branch, has always occupied a prominent place in all experimental and investigational activities. In practically all lines of experiment there are phases where the assistance of this Division is required, and the Division has always co-operated as closely as possible with the other divisions of the System in the study of the chemical problems arising from their work. Thus it makes analyses of fodders and feeding stuffs, fertilizers, insecticides and fungicides, and determines the gluten content of various wheats. In addition, its main lines of independent research are the collection of data in agricultural meteorology and the study of these as to their influence on crops; the study of soils from irrigation tracts in Canada with a view to their classification into irrigable and non-irrigable lands.

Samples of well waters from farm homesteads are analyzed free of charge, and the work has done much to prevent the use of impure well waters and to indicate the methods of protection from contamination.

The Division carries on extensive investigational work with fertilizers at a number of the Farms and Stations with a view of ascertaining the most profitable composition and quantity of various fertilizers to be applied with and without manure.

The Division has done a large amount of work in the analysis of feeding stuffs, of sugar beets for factory purposes, of

fertilizer materials, and of samples sent in by the Meat Inspection Division of the Health of Animals Branch and from other sources.

Division of Botany

Work in Economic Botany and Plant Pathology was undertaken upon the establishment of the Experimental Farms System, as forming a part of the Division of Botany and Entomology. In 1909, this work was sub-divided and separate Divisions of Botany and Entomology were formed, the latter a few years later being made into a separate branch of the Department of Agriculture.

The work of the Division of Botany comes under the two heads—economic botany and plant pathology. The former, carried on chiefly at Ottawa, consists of the study of medicinal, poisonous and other economic plants; also the life history of weeds, with a view to their control and eradication. This section also deals with the identification of specimens sent in by correspondents, and has charge of the divisional herbarium and of the Arboretum at the Central Farm.

To carry on the work in Plant Pathology, there have been established, in addition to the Central Laboratory, laboratories at Charlottetown, Fredericton, St. Catharines, Brandon, Winnipeg, Indian Head and Saskatoon, and one is now being located at Summerland, B.C. The problems being studied are principally those affecting crops in the vicinity. Thus in New Brunswick, Nova Scotia, and at St. Catharines, Ont., diseases of fruit trees are under investigation. In the Prairie Provinces, the laboratories have for their special object the study of rusts attacking wheat. The laboratory at Summerland will be especially devoted to the study of fruit diseases.

Division of Illustration Stations

This Division was formed in 1916, and is in charge of a Supervisor and five assistants, two for the Prairie Provinces, two for Quebec, and one each for New

Brunswick and Nova Scotia. At present the number of these Stations is eighty-six.

The object of the illustration Stations is to serve as a connecting link between the Experimental Farms System and the farmer. A representative farmer is chosen in each locality, and on a certain area of his farm are illustrated the best rotations, the best varieties of crops, and the best cultural methods as determined on the Experimental Farms. Detailed data on cost of production are being gathered in connection with this work. Seed grain produced on these farms is available to the farmers in the district served. Neighbourhood meetings are held at which farming problems are discussed.

Division of Extension and Publicity

This Division, formed in 1914, aims at making known the results of the work carried on by the Experimental Farms System. A chief means to this end is the placing of exhibits of an educative character at as many as possible of the fairs held throughout the Dominion.

The number of fairs attended is limited only by the difficulty and expense of

arranging a sufficient number of circuits to permit of more being covered. Plans are being made to permit of all fairs being attended at least once in three years, the only trouble in this being that the Farms' exhibit has proven such an attractive feature that fair managers are anxious to secure it every year. At these fairs, leaflets written in popular style, are distributed, and farmers are invited to add their names to the mailing list of the Department.

General

The Experimental Farms Branch, in addition to the above work carried on by the various Divisions, endeavours to assist the farmer through correspondence, through the issuing of reports, bulletins, circulars, and pamphlets, through the issuing of *Seasonable Hints*, a small periodical, brought out every four months and containing articles on timely topics, through the sending out of press articles to farm journals, periodicals, and newspapers throughout Canada, by giving assistance at lectures, short courses, demonstrations and judging, and by encouraging the holding of excursions to the Central and Branch Farms by farmers' organizations.

NITRO-CULTURES AND THEIR DISTRIBUTION

BY R. A. INGLIS, B.A., JUNIOR BOTANIST, CENTRAL EXPERIMENTAL FARM

IN the belief that the Dominion-wide service of distribution of nitro-cultures, inaugurated in 1915 by the Central Experimental Farm at Ottawa through the Division of Botany, is not even yet as widely known and utilized as it might and should be, it is considered advisable to give a short account of its objects, work, and methods.

Underlying all the activities of the Dominion Department of Agriculture lie two basic principles: first, that the fertility of the soil of Canada is not inexhaustible; and second, that the more varied the products of farming can be made, the better will the fertility of the

soil be maintained. It is owing to the role that legumes play in assuring this second aim, that the distribution of nitro-cultures was undertaken and is still maintained.

This term, "legumes," be it noted, is used in its technical sense of a member of the family *Leguminosae*, and not in the rarer sense, derived through French influence, of an esculent vegetable.

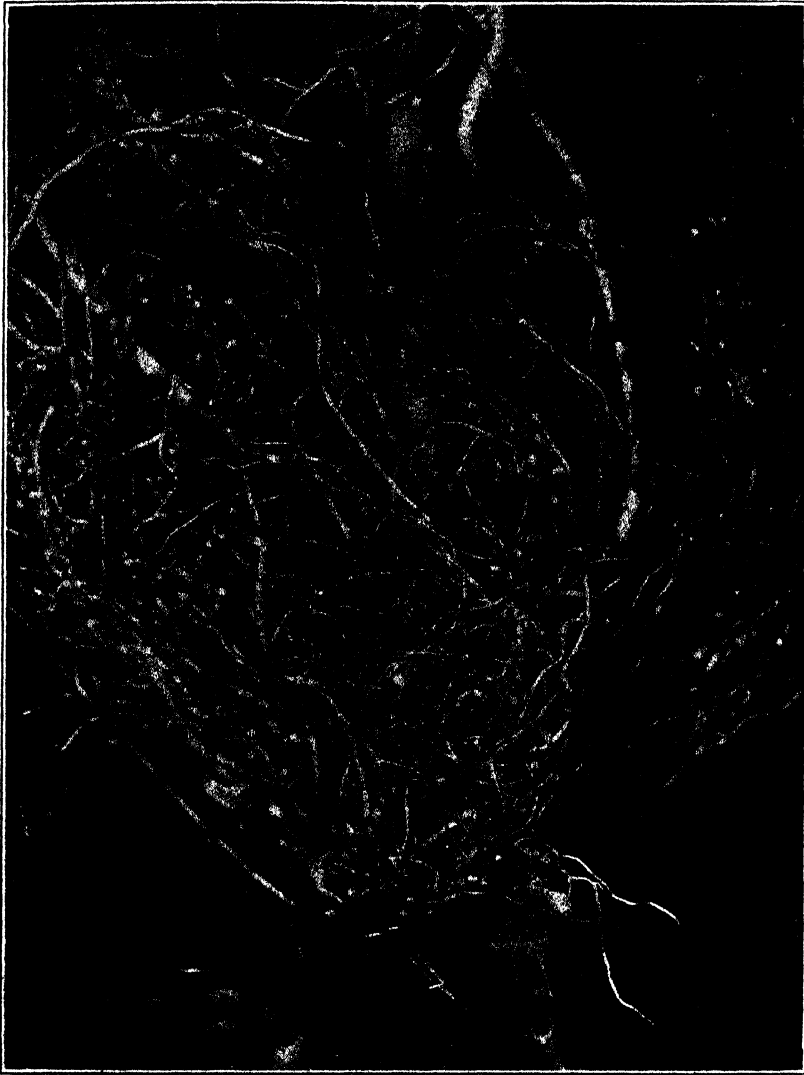
Legumes meet the requirements of the case by introducing new crops in districts where they had not previously been grown or grown successfully; by aiding in restoring fertility to the soil;

and by assisting in extending stock-farming.

That the growth of a legume in a crop rotation somehow increased the yield of succeeding crops has been

this action has been discovered, and the casual organism proved by repeated experiments to be a bacterium.

The legumes, in the absence of certain bacteria can grow in suitable soils, but



Root Nodules of Clover.

known since the earliest times, was practised by the ancient Egyptian, and is recorded by several ancient Roman writers. Yet it is only within the life-time of many, that the reason for

do so at the expense of drawing on the nitrogen material of the soil, as do all other crops. When, however, the bacteria are present, and live in partnership with the plant, or in "symbiosis,"

to use the scientific term, these micro-organisms can abstract free nitrogen from the air and transmute it into forms available for the plant's nutrition. On the completion of the crop's life cycle, if roots and tops be ploughed under for soiling purposes, the net result may in favourable cases be an actual addition to the nitrogen resources of the soil.

This, briefly put, is one main reason for growing a legume crop. And the extent to which this aim is attained, can be roughly gauged by the presence of root nodules on the crop. These nodules are tiny lumps, attached mostly to the finer rootlets, varying in size, according to the plant, from that of a small pin head to a pea. These lumps are really a changed tissue growth, or callus over wounds, caused by the entry of bacteria into the plant's system.

The object of nitro-culture distribution is to furnish cultures of these nitrogen-gathering organisms in a viable condition ready to be introduced at sowing time, along with the seed of the chosen legume, into soils where they may be wanting.

The bacteria concerned in the nodule formation described above, belong to two or three varieties only amongst the many that infest the soil, and the problem before the bacteriologist is to isolate the required organisms and grow and multiply them on suitable media, separating the colonies thus obtained into suitable dosages for the treatment of seed. Thereafter the problem is transferred to the practical agriculturist or farmer.

While the legume family is an extremely large one from the farming point of view in Canada, the crops grown narrow down to clovers, sweet clovers or melilot, alfalfa, peas (garden, field or sweet peas) and beans, with a small demand for soy beans occasionally. With the exception of the soy bean, all the other plants mentioned live symbiotically along with the organism known as *Bacillus radicicola*.

The isolation of this *Bacillus* does not, however, end the bacteriologists'

task, since the organisms have developed into specific strains, which will only inoculate certain classes or groups of legumes, and cross-inoculations between these groups do not occur, or, if they do, do so but rarely and with difficulty. Again, best inoculation results take place, as would be naturally expected, with organisms taken from a given specific plant on other plants of the same species.

The groups we are concerned with are:—

- (1) The Clover group, i.e. red, crimson, white, zigzag, or alsike. (*Trifolium pratense*, *T. incarnatum*, *T. repens*, *T. medium*, and *T. hybridum*);
- (2) The Alfalfa group, i.e. alfalfa, medick, and sweet clovers, white or yellow. (*Medicago sativa*, *M. lupulina*, *Melilotus alba* and *M. officinalis*);
- (3) The Pea group, i.e. garden and Canada field pea, vetch, and sweet pea. (*Pisum sativum* and its variety *arvense*, *Vicia sativa*, and *Lathyrus odoratus*);
- (4) The Bean group, i.e. garden and scarlet runner beans. (*Phaseolus vulgaris* and *P. multiflorus*).

The soy bean, *Glycine hispida*, is inoculated by a different organism, a *Pseudomonas* probably; (Lörnis and Hansen, January, 1921).

The technique of isolating, growing and testing the organisms may be omitted, as being of interest to but a limited circle of readers. Suffice it to say that the finished result, as it comes to the farmer's hands, is in small corked phials; containing (a) a jelly substance, viz., the medium or artificial soil holding in solution the nutritive substances requisite to maintain the bacteria alive in transit to their destination; this jelly is insoluble in the further treatment the farmer will give the contents, and may be neglected by him as having served its purpose; and (b) the really important part, a thin layer of viscid transparent slime, which consists of millions of

bacteria. These bacteria have to be transferred by him to the seed.

Each bottle contains on an average sufficient bacteria to inoculate about a bushel (60 pounds) of seed of the particular variety specified by the farmer. These bottles should not be opened till required for use, nor should the bacteria be exposed to direct sunlight, which will kill them.

The transference of the bacteria to the seed is effected by washing this slime off the jelly by some liquid, generally sweet skim milk with a little sugar added. The seeds are treated with this slightly sticky liquid, and the suspended bacteria adhere to the seeds, which, when dry, are sown and covered with earth. Here again, a cloudy day is best to choose for seeding, so as to avoid exposing the bacteria to sunlight. Full instructions for use, which are only outlined above, accompany all bottles.

The essential points for applicants to bear in mind are these:—

Dominion and provincial agricultural institutions will be supplied with all reasonable requirements in the way of bottles of culture within our resources.

Individual farmers are restricted to not more than three bottles each, sufficient for treating some 180 to 200 pounds of seed in all. These are supplied free of charge.

Each applicant should state the kind of seed he wishes to treat and the quantity, and, if possible, give an approximate idea of his date of sowing, since it is preferable to supply him with his cultures as fresh as possible, that is, within a few days of the time of probable use.

We request applicants to co-operate with us by sending us on forms supplied by us, certain information after the harvests have been gathered in.

In conclusion, we would like to quote some passages from recent correspondence, as to results obtained. From Beaverlodge, Alberta, dated August, 1921, we received the following:—

Some very striking evidence is coming to light of the advantage of artificial inoculation of legumes. In adverse seasons it seems to make all the difference between fair success and dismal failure. In the present dry season we had a plot of alfalfa, the seed for which was inoculated with nitro-culture last year, which has cut over a ton and a half of cured hay per acre.

Until the present year, we never had a nurse-crop-seeded plot of alfalfa or clover that was worth leaving for hay. This year, from plots of red clover, alfalfa, and sweet clover sown with nitro-culture-treated seed in 1920 on a nurse-crop of oats, being the third crop following breaking, we have yields which will run from around three-quarters of a ton of red clover per acre to nearly a ton of alfalfa and more of melilot. In fact, in this test, the legumes are yielding roughly twice as much hay as the most productive grasses. This is a complete reversal of previous experience and we can attribute the change to no influence but inoculation.

At the same station results with field peas are so far disappointing, however.

Dated October, 1921, we received the following summary of results from certain Illustration Stations:—

I have just returned from an inspection trip to the Illustration Stations in New Brunswick and Nova Scotia, and have examined many of the fields sown with clover seed, part of which was treated with nitro-culture, and part sown without. In every instance I find where the seed was treated with culture that the plants were larger, the ground better covered, and nodules could plainly be seen on almost every root; while the untreated showed a smaller growth, and very few nodules.

When on my visit to Alberta and Saskatchewan I examined the sweet clover plants that had been treated and those untreated, and I found the same condition in favour of treating with nitro-culture. From the results of treating the clover seed in the past two years I have fully decided not to sow any clover seed this coming year without treating with nitro-culture, excepting for illustration purposes.

In Saskatchewan, contrary to the experience at Beaverlodge, Alberta, field peas at Scott show a gain of two bushels to the acre for inoculated over uninoculated crops.

A NATIONAL SWINE POLICY

Forward Movement to Stimulate Hog Production and the Export Trade in Bacon

RECOGNIZING the fact that the swine industry in its relation to the export trade is in an unsatisfactory condition, the Dominion Minister of Agriculture, Honourable Dr. Tolmie, early in November last called a representative conference at Ottawa, of Producers, Packers, and Officials of Provincial Departments of Agriculture, at which a national swine policy was agreed upon, having for its objects, the production of a uniform type of bacon hog, a regular volume of supply, recognition for the producer of a quality product, and stimulation of the export trade in Canadian bacon both as regards quality and volume.

Resolutions

The following were the resolutions adopted:—

“That the Dominion Department of Agriculture be asked to establish a standard of grades for hogs under the Live Stock and Live Stock Products Act, and to appoint official graders or referees to be available at stock yards, abattoirs and other points where necessary.”

“That this meeting expresses its approval of compulsory grading of hogs at stock yards, abattoirs and other points where necessary.”

“That this Convention adopt the standards for grades as laid down by Mr. E. C. Fox.”

“That the Dominion Department of Agriculture be asked to appoint an official to study the methods employed by the various Canadian packers in the grading of bacon for the export trade and to study also the export trade, looking toward the possibility of improving the standard of grades, and also looking toward the possibility of creat-

ing greater confidence between farmers and packers.”

“That this conference expresses its approval of the principle of a permanent committee composed of three men, one representing the Department of Agriculture, one representing the packers and one representing the producers, each man to be paid by the group he represents, and urges that this committee begin functioning as soon as possible.”

“That all interests represented at the conference agree that the future of the Canadian hog industry depends upon the production in Canada of the select bacon hog, and declare themselves unreservedly for the principle that a minimum premium of 10 per cent should be paid for hogs suitable for the production of select bacon.”

“That the grading of hogs as set out in this conference, come into effect on May 1, 1922.”

“That this conference fix no differentials in price between the grades of live hogs, other than “Select Bacon,” and “Thick-Smooth” hogs, already settled, but leave the amount of the spread between all grades, except the first two grades to be determined by supply and demand.”

Standards Adopted

Select bacon hogs.—Jowl and shoulder light and smooth; back from neck to tail evenly fleshed; side long, medium depth, dropping straight from back, ham full, good general finish, no excess fat. Weight 160-210 lbs.

Thick-smooth hogs.—Not conforming to Wiltshire standard, but of smooth fleshing and finish. Weight 160-210 lbs.

Heavies.—Any type of smooth fleshing and finish. Weight 210-260 lbs.

THE AGRICULTURAL GAZETTE OF CANADA

Extra heavies.—Ditto. Weight over 260 lbs.

Shop hogs.—Any type of smooth conformation; finished. Weight 120-160 lbs.

Lights and feeders.—Any type of smooth conformation; unfinished. Weight 160 lb. and under.

Roughs.—Of rough conformation; any weight.

Sows.—All females that have reared one or more litters. No. 1: Sows of smooth finish and smooth underline up to 350 lb. No. 2: All other sows.

Stags.—Hogs that have been castrated and are well healed before being offered for sale.

The Department of Agriculture is taking immediate action to give effect to the national swine policy as outlined at the conference. Under the policy, all hogs marketed at public stock yards and abattoirs on and after May 1, 1922, will be sold according to official grades in which a minimum premium of ten per cent will be recognized for select bacon hogs. The grading will be carried on under the direction of the Dominion Live Stock Branch, according to standards acceptable to producers and to the trade.

Competent officers will be chosen, according to their ability, by competitive examination satisfactory to producers and packers, to undertake the grading of live hogs, and also educational and development work throughout the country. In addition an expert is to be engaged to study the bacon

industry in its relation to the export trade. He will have full access to the Canadian packing plants to study general and technical problems. The situation in Great Britain will also be considered. The effect of this should result in greater confidence between farmer and packer and tend to produce more uniformity in the export product.

A permanent board of three, consisting of one representative each for Packers, Producers and the Dominion Department of Agriculture will be appointed as soon as possible. This board will study the various problems relative to the production and marketing of hogs and hog products, with special attention to supply and demand in relation to market prices.

The Minister has approved the recommendations presented by the Conference respecting the grading of hogs, and the Department is now preparing the regulations, which will become effective under the Live Stock and Live Stock Products Act, 1917. The necessary steps will be taken to arrange the work in conjunction with provincial Departments of Agriculture, Agricultural Colleges and Producers' organizations. During the winter, the programme will be presented at farmers' meetings in order that the country may be properly informed as to the underlying principles, the effect of grading, and the influence that such a movement will have upon the ultimate market. The Government is now taking the necessary steps in order that the policy may become effective on May 1, 1922.

POULTRY DISEASE RESEARCH

BY A. B. WICKWARE, V.S., ANIMAL PATHOLOGIST, HEALTH OF ANIMALS BRANCH

IN the interest of the poultry industry the Health of Animals Branch through the agency of the Biological Laboratory detailed the writer to make a survey and study of the various

disorders to which fowls are subject, and for the past few years a specialty has been made of poultry diseases. A branch laboratory has been established in the new poultry building at the Cen-

tral Experimental Farm, and whole-hearted co-operation is being given in this work by the officials of the Poultry Division.

Owing to the prevalence of certain infectious diseases such as tuberculosis in fowls and blackhead in turkeys, outbreaks of which are attended with a high rate of mortality, a systematic study has been carried on to establish reliable methods of diagnosis in both of these affections. Efforts have also been directed towards finding curative remedies and although this latter endeavour has not met with marked success, our increased knowledge of the conditions has aided greatly in pointing out methods of prevention. Bulletins issued by the branch, dealing with tuberculosis and blackhead, have, undoubtedly, led to a better understanding of the disorders. A great deal of research regarding tuberculosis remains to be done to establish its relationship to the forms occurring in man and animals, as it has already been shown that tuberculosis of fowls is communicable to hogs, and must be reckoned with as a possible source of infection when dealing with the disease in other animals.

At the present time our attention is being chiefly directed towards the affections commonly known as roup, chickenpox, canker, etc., which yearly cause great losses, not only through the death of infected fowls, but by decreased production. Roup, which name will serve in general for the various forms of this disease, is very prevalent during the winter months and has been a subject for study in Canada and other countries. In certain parts of the United States vaccines have been used with great success in preventing outbreaks, and the few experiments carried out in Canada have also been attended with good results. We purpose making a systematic study of the various forms of this disease, and applying the

knowledge already gained, together with new principles, in the work of controlling outbreaks.

The causes of chick mortality are also investigated from year to year, and it has been found that the diseases of chicks are many and varied. Defective incubation, improper feeding, etc., are contributing factors in pre-disposing chicks to disease, and various experiments are being carried on to reduce, if possible, the heavy death rate.

Ducks and geese which were formerly considered immune to diseases in general, have, during the past few years, contracted disorders peculiar to water-fowls, and studies have been carried on with a view to attaining a better understanding of the conditions.

Another phase of poultry disease research, which has received scant attention, is parasitic conditions. Worms of various kinds are harboured by fowls, and these exert a very harmful influence on the hosts. A survey is being made by the writer of the various provinces of Canada to determine what parasites are indigenous to certain districts, in order that their life histories may be worked out and measures instituted for controlling the sources of infection.

In addition to the foregoing a certain number of illustrated lectures relating to poultry diseases are given each year before veterinarians in annual convention and at poultry association meetings. Several hundred specimens including dead fowls and diseased tissues are examined each year, and numerous letters of enquiry with regard to diseases of fowls are answered.

From time to time new conditions arise which demand immediate attention, and the results of our investigations are summarized and published as occasion permits, in the various journals devoted to the interests of the live stock industry.

THE INTERNATIONAL SEED CONTROL CONGRESS

BY GEORGE H. CLARK, B.S.A., COMMISSIONER, SEED BRANCH

THE International Seed Control Congress held at Copenhagen from the sixth to the eleventh of June was called by the Danish Government at the request of the Governments of several of the neighbouring countries of Europe.

The matters taken up for consideration at this Congress had to do with ways and means for measuring the utility value of agricultural and other seeds of commerce. Matters pertaining to laws and regulations, or their administration were not before this Congress except quite indirectly.

Thirty delegates were present representing sixteen countries of Europe and one from North America. Professor Dr. W. Johannsen, Chairman of the State Seed Testing Board of Denmark, was elected Chairman of the Congress, and discharged these duties in an admirable manner. When addresses or papers were presented in the English, French or German languages, Dr. Johannsen reproduced the essentials of the matter presented in the other two languages, inasmuch as many of the delegates were not familiar with more than one or two of the languages. All of the delegates had been requested to go to the Congress with full authority to enter into agreement on behalf of the country they represented, and most of the delegates in attendance were possessed of that authority.

Seed Analysts and Seedsmen of North America may not fully appreciate the advantages of having at our continental Congresses whether of the Seed Trade or of Seed Analysts, a homogeneous body, all speaking the same language, of common ideals (or nearly so) and none possessed of doubt as to the good intentions of the other. Our North American Association of Seed Analysts would, after due consideration, arrive at a definite decision within a few hours in a matter

that might prove difficult or impossible of adjustment at a Congress of a kindred European Association.

This Congress at Copenhagen formed a permanent Association of all Seed Testing Institutions in Europe. The Directors of the State Seed Testing Stations in Denmark, Holland and Switzerland were elected members of a Committee to carry into effect the objective of the new Association and to institute co-operative work, looking to the unification of the practice in seed testing and reporting that may be approved for all Seed Testing Institutions in Europe. Dr. A. Volkart of Zurich, Switzerland, presented a valuable report on methods for seed testing to determine the origin of red clover, alfalfa and other seeds.

A Committee was formed consisting of Dr. v. Degen, Budapest; Professor Voigt, Hamburg; Professor Bussard, Paris; Dr. Vitek, Prague, and Dr. Enesco, Bucharest, to conduct further investigations concerning the geographic areas in which Dodder Seed (*cuscuta* sps.) are produced, and also the areas in which Dodder may not be considered as a noxious weed. Discussions indicated that red clover seed containing dodder seeds was not as a rule suitable for planting in northern areas where dodder does not give trouble as a weed, for the reason that the crop from such clover seed is not sufficiently winter hardy.

Excursions were made by the Congress to the control fields of the State Seed Testing Station, where the third and highly important division of seed testing is conducted, namely; that of determining the genuineness of the seed stock. Visits were also made to the State Experiment Station, the Museum of Agriculture and the plant breeding Station at Tystofte.

Considerable time was devoted to the discussion of the methods for testing

and reporting upon those varieties of grass seeds of commerce which commonly contain a large percentage of chaff or seeds without a properly developed kernel. Dr. Bruijning of Wageningen, Holland (deceased, July 21, 1921) submitted a statement as to the seed testing and reporting practices in Holland in reference to this matter. Heretofore the practice under the English, Scotch and Irish Boards of Agriculture has been to put to germinate all of the seeds irrespective of whether the kernel contained in them was properly developed. Dr. Bruijning submitted the results of extensive investigations to show that by whichever system the percentage of germination is determined the ultimate result was approximately the same when expressed in terms of pure germinating seed.

The discussion at the Congress would indicate that in Europe as elsewhere, there are some seedsmen who are disposed to put forward in their advertisement only the statement of the percentage of germination when obtained by the so-called continental system of seed

testing, notwithstanding the fact that the per cent of chaff or inert matter as reported under the same system may be very large. As a measure of compromise, in an endeavour to arrive at unification in this matter, a resolution was passed to the effect that all of the State Seed Testing Stations of Europe report the per cent of "pure germinating seeds" and in addition state the per cent by weight of chaff and other inert matter.

A resolution was passed fixing the time and place of the next Congress to be held in 1924 in England at the call of the Committee.

The report of the Congress was authorized to be printed under the editorship of Dorph Petersen, Director State Seed Testing Station, Copenhagen, to be presented in the languages employed at the Congress. As President of the Association of Seed Analysts of North America, the writer placed Requisition for 100 copies of this report supplied at cost. Any persons who may desire to have a copy of it may do so, while the supply lasts.

THE EUROPEAN CORN BORER IN SOUTHERN ONTARIO

BY LEONARD S. McLAIN, DIVISION OF FOREIGN PESTS SUPPRESSION,
ENTOMOLOGICAL BRANCH

IN the October, 1920, issue of the Agricultural Gazette a brief report appeared dealing with the discovery of the European Corn Borer in Welland county, Ontario, and in the December, 1920, issue of the same publication a second article appeared which reported the extent of the infestation found that year. During this past summer extensive scouting for this pest has been carried on in co-operation with the Ontario Department of Agriculture, and it is regrettable to state that this serious pest has spread over quite a large area in the southern portion of the province.

It is to be hoped, however, that this past season was unusually favourable for the European Corn Borer, as this insect was responsible for a great deal of damage in the more heavily infested districts, particularly Elgin county. The injury in Canada up to the present time has been confined to corn, although in the infested area in Massachusetts certain vegetables and flowers have been severely attacked.

In Elgin county last summer, in an area of approximately forty square miles centering about Union Village, the sweet corn crop was almost a total failure on

THE AGRICULTURAL GAZETTE OF CANADA

account of the ears and stalks being so badly infested by borers. Flint corn was also severely attacked, and "certain fields had to be cut in the middle of August in order to salvage a little feed from the crop before it was entirely lost." The caterpillars in one badly infested field of flint corn were estimated as numbering 269,000 per acre.

The summer of 1921 will long be remembered as one of continued high temperatures and extended drought. The plant growth developed with abnormal rapidity, and it was necessary to start the scouting work two weeks earlier than was originally planned, on account of the rapid growth of the early planted corn.

The field scouting was started on August 1, and was not completed until October 3. During this period an average of eighteen men and four Ford cars were engaged on the work. Soon after the field work commenced, it was realized that the pest had spread over a much larger territory than was anticipated at the beginning of the season, making it necessary to modify the original plans and also to take on additional men. The area adjacent to the territory found infested last year was scouted. This included all the townships in the province south of a line drawn from Oshawa to Kincardine (on Lake Huron); as well as each township from Kincardine around the Lake Huron and Georgian Bay shores to Collingwood; the townships immediately surrounding Lake Simcoe, and along Lake Ontario and the St. Lawrence River from Oshawa to Brockville, including Prince Edward county. A total of one hundred and ninety-seven townships were examined, sixty-five of which were found infested by the European Corn Borer. In 1920, thirty-five townships were found infested, making a total of one hundred townships infested by this pest to date. The area infested this year covers approximately 4,910 square miles and this added to last year's area of 2,780 square miles brings the total up to 7,690 square

miles infested at the present time. The spread of the insect into new territory was more or less general from practically all points of the 1920 area, but the most noticeable spread has been in a northerly, northeasterly, and easterly direction.

The more severely infested sections are in Elgin and Middlesex counties, whereas the outer limits of the area are fortunately very lightly infested, and considerable time was taken by the scouts in the making of the necessary collections. The corn borer invaded, this year, three townships in Essex county and four additional townships in Kent county. In the townships adjacent to the Lake Erie shores all the collections of larvæ were made in fields along the Talbot road, which is the main highway running east and west. The infestation in these townships may be due to the artificial spread of the insect either by carriers such as automobiles, or from infested corn refuse washed up on the lake shore.

The only completely isolated infestation found this year is in Pickering township, Ontario county. The collection consisted of eight caterpillars found in a garden in the town of Pickering. Although the entire township, as well as the adjacent townships were carefully rescouted no other infestation was uncovered. The nearest outbreak to this township is in Lincoln county, across Lake Ontario, and approximately forty-five miles away.

In order to prevent the distribution of the corn borer into new districts by artificial means, in November, 1920, an embargo was placed on the districts found infested by the pest. This order prohibited the removal of corn stalks, broom corn, green sweet corn, roasting ears, corn on the cob or corn cobs from the quarantined district. This embargo was amended in May, 1921, and during the summer three additional amendments were passed, quarantining the townships found infested as the scouting work progressed.

The counties and townships infested and quarantined at the present time are: Oakland, Brantford, Burford, and Onondaga in Brant county; all of Elgin county; Gosfield South, Mersea, and Pelee Island in Essex county; all of Haldimand county; Goderich, Hay, Stephen, Tuckersmith and Usborne in Huron county; Gore of Camden, Harwich, Howard, Orford, Raleigh, Romney, Tilbury East, and Zone in Kent county; Brooke, Euphemia, and Warwick in Lambton county; Clinton, Grantham, Louth, and Niagara in Lincoln county; all of Middlesex county; all of Norfolk county; Pickering in Ontario county; all of Oxford county; Blanchard, Downie, Easthope North, Easthope South, Ellice, Fullerton, Hibbert, Logan, and Mornington in Perth County; Waterloo, Wilmot and Woolwich in Waterloo county; all of Welland county; Guelph in Wellington county; and Ancaster in Wentworth county.

To assist in maintaining this embargo, warning notices were placed at all road intersections leading out of the quarantined area. In addition large canvas banners, two and one-half feet by eleven feet, were strung across the main automobile highways warning motorists and others not to take corn from the infested area. On several Sundays and holidays inspectors were stationed on these highways to stop and search cars for sweet corn; a total of three hundred and thirty-four cars were stopped and three dozen ears of corn seized. A careful watch was also kept

on all markets, in co-operation with the fruit and seed inspectors, and five dozen ears of corn were seized at a market located just outside the quarantine area. In addition, inspectors were stationed at all the large fall fairs.

On July 21, 1921, the United States Department of Agriculture placed an embargo on the province of Ontario, which prohibited the importation into the United States of certain cut flowers and vegetables unless the same were accompanied by a certificate of inspection. As soon as this embargo was put into effect the department endeavoured to get in touch with all market gardeners, florists, etc., and arrange for the inspection of their export products. Between September 1 and October 31, 304 shipments were inspected and certified. The inspections included approximately 10,000 cut flowers (mostly chrysanthemums), four and one-half acres of flowers in the field, and thirty-seven acres of growing celery. It was realized, however, that a large number of shipments were refused entry at the United States border ports on account of not being accompanied by a certificate, the exporters having failed to apply for the services of an inspector. According to figures submitted by the United States authorities, the following products were refused entry between July 21 and November 15 in the Windsor and Sarnia districts: 1,227 bushels of corn, 2,028 bushels of beets with tops, 1,315 bushels of beans in the pod, 518 bushels of rhubarb, 490 bushels of celery, 956 bouquets of flowers, and 39 funeral pieces.

COMMERCIAL FERTILIZER ADMINISTRATION

THE Fertilizer Act which was formerly administered by the Department of Inland Revenue, later by the Department of Trade and Commerce, and prior to April 1, 1921, by the Department of Health, was on that date transferred to the Department of Agriculture. The Act as constituted, together with amendments thereto, is designed to fit into the administrative organization of the other departments. The recasting of the Act and amendments to make it fit into the administrative organization of the Department of Agriculture is highly advisable, if not really necessary.

The Fertilizers Act, in common with the fertilizer regulations of most other countries, aims to place restrictions on the sale of private or patent brands of fertilizers that are compounded from secret formulas. Wartime experience in several countries has demonstrated advantages to agriculture that accrue from providing and enforcing regulations that have for their object the control of the

manufacture of fertilizers from formulas prescribed in respect of both materials and chemical constituents.

In drafting of a new fertilizer act for Canada consideration may be given to this innovation in fertilizer control which has proven to be highly satisfactory in some other countries. It is generally conceded that the manufacture and blending of compound fertilizers may not be practicable for prescription of a quantity less than a car lot or even several car lots, or sufficient to absorb the operations of a manufacturing plant for one full day at least. In consequence the manufacture of fertilizers according to prescription has of necessity certain limitations that will require careful consideration in the planning of new regulations.

For the purpose of convenience the administration of the Fertilizers Act has been connected with the already established Division of Markets of the Seed Branch.

HONOURABLE W. R. MOTHERWELL, MINISTER OF AGRICULTURE

THE Honourable W. R. Motherwell has been assigned the portfolio of Agriculture in the cabinet of the Hon. W. L. Mackenzie King. Mr. Motherwell, who is well known to farmers and agriculturists throughout the Dominion, will bring to bear the experience gained as Minister of Agriculture for Saskatchewan from 1905 until the end of 1918, under the Scott administra-

tion. The new Minister is a native of Perth county, Ontario. After attending the Ontario Agricultural College, he settled in Western Canada in 1881, where he operates an extensive farm at Abernethy. He is credited with having formed the first Grain Growers' Association in Saskatchewan, and for some time was President of the Central Canada Seed Growers' Association.

PART II

Provincial Departments of Agriculture

ONTARIO'S WORK UNDER THE AGRICULTURAL INSTRUCTION ACT

BY W. BERT ROADHOUSE, DEPUTY MINISTER OF AGRICULTURE

IN the nine years during which The Agricultural Instruction Act has been in effect the province of Ontario has received the sum of \$2,675,290.54. This is an average of slightly less than \$300,000 per annum and is the amount due Ontario on the basis of population, which, briefly speaking, was adopted as the basis of distribution in the Act. These moneys have been carefully expended in Ontario for the furtherance of agricultural educational and demonstration work. They have accomplished many concrete results in themselves and have in addition been accompanied by larger Provincial appropriations for the carrying on of strictly agricultural work. In 1913 the Provincial appropriations for agricultural work amounted to \$1,160,574.50 and in 1921 to \$1,661,068.

Incidentally it may be noted that in this province the Federal moneys have gone entirely towards the work for which they have been intended and not a dollar has been absorbed in administrative expenditures. Moneys received under The Agricultural Instruction Act have been used to supplement the regular work of the department in many instances and develop new lines in a few instances. Hence it has been possible to add the administrative duties to the regular work of the officers of the department and utilize the Federal moneys for services and expenses essential to the work for which they were apportioned. All accounts have gone through the Provincial Audit Office and have been itemized and scrutinized in exactly the same

manner as all Provincial accounts. As to the work accomplished, it may be best understood by a consideration of the various lines for which money has been apportioned under the agreements made from year to year between the Federal and Provincial Ministers of Agriculture, as required by the Act.

Agricultural Representatives

Slightly more than one-third of the moneys received in this connection have been utilized in developing and extending the Agricultural Representative Service of the province. As is fairly well known, Ontario was the first province or state on this continent to adopt the policy of stationing young men trained in practical and scientific agriculture in local districts for full time service to the farmers and the farming industry. The first men for this work were appointed in Ontario in 1906 and it was not until a year or two later that the initial steps along similar lines were taken in some of the states to the South. In Ontario the work was permitted to develop gradually and in pursuance of demands of the farmers as they became familiar with the nature and value of the work. By 1912 the work had begun to establish itself and the demands from different counties in the province were becoming so numerous as to surpass the capacity of the Provincial authorities to provide funds for development. By 1912, however, local representatives had been appointed in 31 counties or districts. The passing of The Agricultural In-

struction Act permitted the more rapid development of the work and the number of counties was increased from year to year until at the present time every county and district in the province is served by a permanent representative trained at the Ontario Agricultural College and devoting his whole time and energies to the service of the community. The number of representatives is now fifty. These men are rendering service along a large number of lines on all phases of agriculture, but an effort has been made to emphasize particularly the work among boys and girls and young men and young women of the farms.

As far as boys and girls are concerned, the chief instrument adopted has been the School Fair and this has developed almost entirely under The Agricultural Instruction Act. In 1912 there were only 25 School Fairs in the province, this being the first year they were adopted as a general policy of the department. In 1921, 442 School Fairs were held and in them a total of 93,715 boys and girls participated. As has been frequently explained, the School Fair is an effort to interest the boys and girls in better seed, better stock and better methods of agricultural practice. While the school is used as a unit of organization and the co-operation of teachers and trustees is of inestimable value, most of the work is done at home. The fact that it has grown in response to popular demand and retains its hold from year to year upon both young and old is an indication of its value and usefulness and there is little doubt but that it is the means of giving the boys and girls a new viewpoint on agricultural matters.

Another phase of the work of the agricultural representatives is the holding of an Agricultural Class in January or February. These Classes run for a month as a rule and are attended by from 15 to 50 boys, with an attendance in an odd case going up as high as 90.

The work is of a practical nature, and aside from the instruction the classes have a high social and community value. In 1912 there were 19 of these classes with an attendance of 377. In 1921 there were 39 such classes with an attendance of 1,138. In all the intervening years it is within the mark to say that 4,000 farm boys have been brought under the influence of this work and have come to realize its practical as well as its inspirational value. Out of these classes have grown the Junior Farmers' organizations, with activities in Calf Clubs, Pig Clubs and various other lines. This has been a development entirely within The Agricultural Instruction Act period. In 1912 there were no Junior Farmers' Organizations. In 1921 there are 104 associations with a total membership of 2,815.

While the agricultural representatives have thus devoted a good deal of attention to work among the rising generation, it should not be forgotten that they have also looked after a vast amount of other work. For instance, the period under consideration includes the entire period of the war. During this time the agricultural representative system was the most effective organization in making for greater production and in bringing about the maximum war effort in this province from the production standpoint. There were many special lines of work deemed necessary at that time, including the distribution of seed for the growing of special crops, and the value and elasticity of the system in adapting itself to changing conditions was abundantly proven. The growth of this system has been greatly facilitated by The Agricultural Instruction Act, which has financed about one-half of the work of this character carried on in the province.

Ontario Agricultural College

When The Agricultural Instruction Act first came into operation the Agricultural College at Guelph was in need

of additional buildings and equipment to keep pace with the demands for trained men. As it was recognized that this institution was at the very foundation of the system of extending the knowledge of better agriculture throughout the province, and as it was being drawn upon by all the provinces of Canada, it was felt that a certain portion of the money could very well be used to improve its equipment of buildings, as well as strengthening the staff. Accordingly a building programme was adopted and spread over a number of years, the result being that the following buildings have been erected by virtue of the moneys available under The Agricultural Instruction Act: Field Husbandry Building, Poultry Building, new wing Chemistry Building, Physics Building, Boys' Residence accommodating 150. The first-mentioned buildings were erected either before or in the early years of the war. As the war progressed, however, and there was a great need for men and materials for war purposes, further buildings at the College were deferred and the moneys allotted from year to year allowed to accumulate. As a result the new Boys' Dormitory was not begun until after the war and is being occupied this year for the first time. These buildings have greatly strengthened the institution but have not entirely supplied the needs and there will be other buildings required from time to time in the future. While these buildings have been erected at a total cost of over \$400,000 by virtue of The Agricultural Instruction Act, their maintenance has been provided for from provincial funds and within approximately the same period provincial funds have also erected the following buildings: New dairy barn, general dining hall with separate maids' residence, new dairy building, part new Memorial Hall (just started).

Kemptville Agricultural School

A new institution which owes its existence and maintenance entirely to The Agricultural Instruction Act is the

Kemptville Agricultural School. It is an outgrowth of the successful agricultural classes held by Agricultural Representatives, which proved that educational facilities would be taken advantage of if brought near enough to the people concerned. As there was no institution of this kind in Eastern Ontario it was felt that there would be an opportunity to do effective work. Accordingly the decision to establish this institution was made in 1916 and 200 acres of land purchased at Kemptville at a point convenient to both railway and highway lines from many points in Eastern Ontario. Owing to the war the development of the institution was delayed. All efforts were confined to getting the farm in shape and getting some live stock together and the holding of short courses, while the erection of the main buildings and the commencing of the regular courses was deferred until after the war. This work has now advanced and the school is a going concern which has already established itself. As from the start, it is proposed that the institution should serve three distinct purposes: (1) Provide practical instruction in agriculture and domestic science for farm boys and girls with a view to making better farmers and better homemakers; (2) conducting a farm and handling stock in such a way as to be of the greatest amount of practical benefit to the community, particularly in the dissemination of good seed and good stock; (3) a community centre for as wide a radius of Eastern Ontario as possible, serving as a place for gatherings of various kinds. In all three respects the school is realizing expectations. As a school it opened for regular courses last year and had an initial freshman class of about 25. This year it has a freshman class of 28, a second year class of 16, and has started a domestic science course with a class of 16 girls, making a total of 60 students in all. The agricultural courses are two-year courses and do not extend to a degree. As a demonstration farm and community centre it has

THE AGRICULTURAL GAZETTE OF CANADA

also established itself. More registered seed has been distributed from it than from any other government institution in Canada, and the live stock has attracted much attention and won many prizes at different exhibitions. Community gatherings are also held and attract sometimes over 1,000 people. It must also be kept in mind that this record of accomplishment has been made almost before the institution has been completed. A residence for students is now being occupied and there are many things still to be done before the institution can be considered really completed. It is, however, equipped with a good administration and teaching staff, a combined gymnasium and judging arena, and a residence for both the boys and girls accommodating in all about 60 students, as well as barns, stables and other small buildings.

O.A.C. Staff

An average of about \$11,000 per year has been set aside for the appointment of additional members of the staff of the Ontario Agricultural College with a view to strengthening the instruction work. This has proven very useful. In some instances it has started work of far-reaching importance. As an illustration it might be mentioned that by virtue of this arrangement a lecturer was added to the Animal Husbandry staff a few years ago to take up the study of farm management. This resulted in the development of the farm survey work in the Province of Ontario which has been carried on extensively and which has been widely recognized as a work of very great value. It has resulted in the creation of a Farm Economics Department at the College and a Farm Survey staff, which of course are now financed out of the regular provincial appropriations.

Competition Winners

Although requiring a very small financial outlay, one line of work which may be mentioned as having possibilities of

great influence is the competitions. Arrangements were made under the Agricultural Representatives by which competitions have been held each year since 1913 among the young men attending the agricultural classes. These competitions were conducted on a basis of showing the largest amount of actual profit in different farm operations. There have been Acre Profit Competitions showing the greatest profit in growing an acre of various kinds of farm crops, Feeding Hogs for Profit and Baby Beef Competitions. The prize in these competitions was the payment of expenses for attending the Two Weeks 'Short Course' at the Ontario Agricultural College. In all, 454 boys have in this way been sent to the Ontario Agricultural College for two weeks and have been given an advantage which possibly otherwise would not have come to them.

Many other Activities

While the work thus enumerated has accounted for the expenditure of the great bulk of the moneys available, there have been numerous other activities carried out involving an annual outlay of from \$3,000 to \$10,000 per year. It may be sufficient to briefly summarize the activities.

A separate Branch has been created and devoted to Co-operation and Markets. A staff varying from one to three men has been maintained to give information as desired on co-operative organization and the extension of markets. This work has been much appreciated.

A definite service has been maintained in the interests of those concerned in commercial vegetable growing and a staff varying from one to four has been engaged in the service of this important branch of the agricultural industry. Valuable work has been done in carrying on demonstrations in combatting the various diseases which constitute one of the main menaces to success in this industry, and instruction has been given through Short Courses and per-

sonal visits in the best known cultural methods. This work has reached each vegetable growing section in the Province. A study has been made of the soils of the Province and some demonstration work carried on with a view to showing the best methods of maintaining and increasing fertility. A vast amount of information has been secured in this way which will be put to very effective use in future years.

A large number of Short Courses in sewing, home nursing, cooking and similar subjects of interest to rural women have been held through the organization of the Women's Institutes.

Short Courses, mainly in alternate years, have been conducted for Judges who are sent out to Fall Fairs in order to bring about a uniformity of standard in judging and keep the judges posted on the latest information on various subjects.

A large number of drainage demonstrations have been held and surveys of Ontario farms made resulting in the laying of many additional miles of tile drain and thus adding to the agricultural wealth of the Province.

Demonstrations in live stock and poultry, in spraying and the care of fruit trees, in beekeeping, in the growing and use of seed corn, in household science practices, and in miscellaneous subjects of this nature have also been conducted through various organizations from time to time and have resulted in the dissemination of a large amount of useful and practical information.

It will be seen from this necessarily abbreviated statement that The Agricultural Instruction Act has played a large part in the agricultural activities of this Province with corresponding benefit to the industry.

THE ORIGIN, ACTIVITIES AND POSSIBILITIES OF WOMEN'S INSTITUTES IN ONTARIO

BY GEORGE A. PUTNAM, SUPERINTENDENT, TORONTO

IN addressing the World Disarmament Conference, President Harding's message to civilization was: "We are met for a service to mankind. In all simplicity, in all honesty and all honor, there may be written here the avowals of a world conscience refined by the consuming fires of war and made more sensitive by the anxious aftermath." These words will be classed among the most important historic utterances for all time to come; but let us consider for a moment what the leaders of the Nations met for—to determine upon a policy of ceasing to destroy and ceasing to kill. The task which lies before the Women's Institutes, however, and which has been their objective for many years—conservation of life and service to humanity, in the home, in the community, and in the Nation—is a

still more important responsibility. To cease to kill, and to determine not to destroy is but one step removed from barbarity, while the task of the Women's Institutes is the highest ideal of organized civilization.

In the eighties, some few years after the Agricultural College and Experimental Farm had been established at Guelph, when the Government were seeking a means whereby publicity could be given the excellent work undertaken at that Institution, the officials made a generous offer to the farmers whereby lecturers would be sent to them to give information on farming. The organizations formed in the various counties to co-operate in carrying on this work were known as Farmers' Institutes. Our legislators and our educators did not offer a similar service to the women, for

their duties consisted only in caring for human beings. The clothing, the housing, the feeding of the boys and girls, men and women, did not directly increase the monetary returns, and therefore, were not considered as a responsibility of the Government. The women were permitted to attend the meetings planned for the farmers, for they had been "doing their bit," and were desirous of getting information bearing upon butter-making, bee-keeping, poultry raising, small fruit growing, etc., work that women can do, and do well.

Interest in some of the things considered at the Farmers' Institute meetings resulted in a group of women in Saltfleet township, Wentworth county, asking themselves why they should not form an organization for the discussion of their own particular responsibilities and their own work. When the suggestion was made at a Farmers' Institute meeting held on February 19, 1897, to which the women had been specially invited, there was no hesitation in organizing a Women's Institute, and the men were most anxious to assist in whatever way they could. The objects of Women's Institutes as set forth at that time were:—"The dissemination of knowledge relating to domestic economy, including household architecture, with special attention to home sanitation; a better understanding of the economic and hygienic value of foods, clothing and fuels, a more scientific care and training of children with a view to raising the general standard of health and morals of our people." This was added to in later years, as follows:—"or the carrying on of any line of work, which has for its objects the uplifting of the home, or the betterment of conditions surrounding community life." The motto of Ontario Women's Institutes, "For Home and Country," was adopted.

We cannot overestimate the importance of the fact that from the beginning the Women's Institute followed a most effective method—the utilization of local

talent and resources at nearly all of their meetings—and secured specialists through the Department of Agriculture and from other sources for occasional meetings. The system of giving assistance to those who made an honest effort to help themselves was a wise proviso on the part of the government in offering assistance to the Women's Institutes.

The Institute was purely a homemakers' organization, but it was not long before the women of vision and earnestness saw that they had a community responsibility and opportunity as well as that relating to their own homes. There was another branch of house-keeping, community house-keeping, which needed their attention. The readiness with which the practical, efficient, experienced women of Ontario deal with problems of common interest, with unnecessary frills eliminated, is an example of efficiency which I have not seen duplicated; and my observation, based upon eighteen years' experience in co-operation with men's and women's organizations, is that women have the greater capability for organizing the resources of a community—planning work, and effectively carrying out the plans made.

We have in Ontario an organization embracing at the present time nine hundred and thirty branches, with about twenty-nine thousand members, which is recognized by those in close touch with their activities as a most forceful factor in the development of the individual, in making for home efficiency, introducing co-operative methods, establishing high standards for community activities and providing facilities for education, amusement and social intercourse.

In addition to our public and high schools and colleges for the rising generation, we have a school for adults, the Women's Institute, a very broad, a very elastic and very effective institution, throughout rural Ontario, which is something more than a teacher of facts to girls and women. It is an organization through which recommended meth-

ods are given the test of practical application under varying conditions by those who have everyday responsibility in the home and in the community. It is something more than an academic and a technical school. It is a propagandist, an administrator, and a safeguard of sanity in community activities.

Let us ask and answer a few questions regarding this school for grown-ups:—

1. What is the governing body?
2. Who are the teachers?
3. Who are the pupils?
4. What is the curriculum?
5. What are the text books?
6. What are the methods of teaching?

(1) The governing body in the Institute consists of the officers, chosen by the members, who should be representative of all homes in the community. Each branch is in absolute control of its own activities, and the Branches in a district,—sometimes a whole county, sometimes part of a county,—join forces for their mutual benefit, and to extend the work to new localities. Consolidation of the branches of a district facilitates their co-operation with the various departments of government service.

(2) Who are the teachers? The teachers consist of not only the members and other local talent, but also of persons from outside who have had special training along lines of value to the Institute membership. The discovery, utilization and development of local talent is one of the strongest features of the work.

In addition, the Department of Agriculture, through the Institutes' Branch, furnishes lecturers and demonstrators on most liberal terms to instruct and direct in Domestic Science, in all its branches; Health, Agriculture for Women, etc.

(3) Who are the pupils of this wonderful school? The first to be attracted are the women of responsibility in the home; and it is usually the efficient who are most anxious to gain additional knowledge. Then, we have the young women who are beginning to feel a sense

of the responsibility which will come to them in later years. Young girls, over fourteen, find that there is much that they can get and give in the Institute. One most pleasing feature and an evidence of the practicability of the programme is that the pupils never graduate. The longer one is identified with Women's Institute work, the wider the vision and the keener the interest, the greater the desire for knowledge and the opportunity for service.

(4) What is the course of study? In the early days of the organization, food problems, clothing and the general welfare of the family in the home practically covered the field of activity, but it was not long until the members recognized the fact that there was such a thing as community housekeeping as well as the housekeeping and mothering in the individual home. So the programme of activity soon included a survey of local resources, needs and possibilities, embracing the schools, libraries, civic improvement, public health, social and recreational opportunities, local relief work, etc. No two branches necessarily follow the same programme; so the activities can be made very attractive and helpful, for there is elasticity sufficient to meet the needs, desires and ideals of any body of women.

The programme of activity extends from the minutest detail in women's work to grappling with the biggest community problems of the district. A programme to result in the greatest good must be adjusted to local resources, talents, needs and possibilities.

(5) What are the text books? The most important text-book utilized by all the Institutes is that unwritten book of practical experience. Knowledge gained through practical experience by successful homemakers is much prized by the members. The Institutes, in their sanity, make practical application of information and suggestions, whether in print, or by word of mouth, to the resources, capabilities and possibilities of

the individual family and community. The printed text-books consist of standard works of recognized worth along a variety of lines, including health, foods, methods of government,—municipal, provincial, and Dominion; the lighter forms of agriculture, parliamentary procedure, and a great variety of topics of interest to women and girls, not only as house-keepers and homemakers, but as citizens of a democratic country. Reports and bulletins from the various departments of the government, both provincial and Dominion, of interest to women and girls, are furnished the Institutes. The material and practical do not occupy the whole time of the members, for we find literature, debates, social activities, including entertainment of an instructive and recreative character; and games, are not overlooked. There is no restriction so far as the Department of Agriculture is concerned as to subjects to be considered.

(6) The methods of teaching are varied. In the early days it was very difficult in many branches to get the members to prepare papers or addresses or to give demonstrations; so an exchange of recipes, reading of selections from books, reports, bulletins, etc., with occasional papers by the members and other local talent, and assistance from outside by way of addresses from speakers furnished by the government, characterized the work of the Institutes. It was not long, however, until nearly every Institute discovered that it had local talent, both within and without the Institute, with the result that addresses and papers presented at the regular monthly meetings were soon of a high character. The Institutes are now asking for lecturers and demonstrators who have had special training along definite lines; and the demand is increasing, not for single lectures, but for courses of instruction. During the past year we have given in Ontario courses of two weeks, in "Home Nursing and First Aid," "Domestic Science" and "Sewing," to 5,488 girls and women at one

hundred and fifty-five centres. Many Institutes have libraries of their own, consisting of a number of standard works, and, of course, copies of bulletins and leaflets furnished by the Provincial and Dominion governments. Travelling libraries are also utilized to a considerable extent, and the women of the Institutes are co-operating with the local library boards in providing books of special interest and value to girls and women.

The number of girls who must look to the Women's Institute for educational opportunities after they leave the public school will remain greatly in excess of those from the rural districts who can attend high school and college. It becomes the responsibility of the whole people to see that the service to these is efficient and adequate.

The Institute an Advisor and Administrator

While the Institute is an important factor as an educator and developer of talent, it has also come to be something more—an advisor and administrator in a variety of undertakings. True, these advisors and administrators have no legal standing and are seldom clothed with official authority. Nevertheless, the advice and co-operation of women chosen by the members of an organization representing all classes and interests in the community is being sought more and more in all community undertakings.

Many lines of interest to the whole people are receiving valuable support both in management and contributions from the Women's Institutes. Among these we may mention the securing of travelling libraries for many rural centres, reclaiming libraries which were not being utilized, co-operating with local library boards in securing books and periodicals of special value to the women, girls and boys of the community; establishing rest rooms; civic improvement, care of cemeteries; establishing parks, athletic fields, skating rinks, etc.

The tactful way in which the leaders in the Institute have discouraged excesses in social life, without being considered cranks or faddists, is a compliment to the good judgment of the leaders in community organization.

In the Women's Institutes, we have an organization for the education of the grown-ups and a medium through which many lines of government service can be carried on most effectively. This organization does not ask government support in securing buildings, equipment or providing local teachers. Full equipment and local assistance are supplied free. Whatever department of the government or approved organization or institution may wish to co-operate with the people of the rural districts, the women of the Institute are ready to place their machinery at the disposal of the same. Departments of Health, Education and Agriculture are particularly desirous of this co-operation, and much of what they have to offer to the rural districts can be made effective only by co-operation with an organization, and not with the individual.

This women's organization can be made of as much importance and value to the grown-ups as the public schools and colleges are to the youth of the land. The amount spent annually by the government in grants, literature, lecturers,

demonstrators, administration, etc., is less than \$1 per member, per year, while the Institutes themselves devote six to seven times this amount of money to the work.

While it is true that the members appreciate the Institute for the information gained and the advantages enjoyed, one of the chief attractions in this democratic organization is that it provides opportunity for service. The biggest asset of the Institutes, insofar as national strength and development is concerned, is the spirit of service which it has engendered.

Here we have an organization which values very much the assistance received from the Government and is utilizing available funds most effectively. The future success of the work depends upon an enlarged and more efficient government service along a variety of lines, and the accepting of greater responsibility on the part of the women of the Institute, insofar as the extension of the work to new centres and stimulating interest in the activities of the Institute in all communities, are concerned.

There is no good reason why the Women's Institute should not be the educator, the administrator, the advisor, and the safeguarder of the best interest of the whole people in every community.

ALBERTA WOMEN'S INSTITUTE GIRLS' CLUBS

IN 1918 the first of these clubs was organized. The suggestion for organization came from the girls themselves, who were interested in the work of the parent organization—the Women's Institutes of Alberta. In 1919 the Legislature created the legislative machinery under which Girls' Clubs could be formed by eight or more girls living in any rural community, village, town, or city. There are now fifty-eight Girls' Clubs with a membership of nearly one thousand. Desire

for good, wholesome companionship, more especially in the rural districts, has brought many girls into this organization. The programme of activities covers recreation, study, first aid, home nursing, sanitation, home decoration, and furnishing, literary and dramatic efforts, and sewing. Up-to-date and practical books on ethics, sociology, civics, history, and poetry are used in the study courses. The Provincial Department of Agriculture, through the Institute Branch, supplies books to the

Girls' Clubs. The club members are encouraged to accept the advantages of short courses in Household Economics, Home Nursing, Foods and Cookery, Sewing, and Handicrafts. In 1921, over fifty girls attended a two days' annual provincial convention at Edmon-

ton. It is the aim of the Women's Institute Branch to so supplement the present educational facilities that the members of the rural girls' clubs will not only be educated for efficient service, but also for vigorous health and liberal living.

INVESTIGATION OF MAPLE SAP PRODUCTS

BY J. F. SNELL, PROFESSOR OF CHEMISTRY, MACDONALD COLLEGE

DURING the past ten years the Chemistry department of Macdonald College has been carrying on investigations on the products of the sap of the sugar maple. These have embraced: (1) Improvements in the methods of detecting adulteration of maple syrup and maple sugar; (2) Analysis of maple sugar sand and attempts to prepare useful products therefrom; (3) Comparison of the reliability of the various methods used to determine when maple sap has reached the correct syrup density in the evaporator; (4) Investigation of the relations between water content, boiling point and density at the boiling point and at room temperature; (5) Observations on changes of maple syrup and sugar in storage.

Reports on the results of the first three of these lines of investigation have been published from time to time. A series of eight papers has run in the American Chemical Society's Journal of Industrial and Engineering Chemistry. Two papers have appeared in the Transactions of the Royal Society of Canada, one in the Journal of the Society of Chemical Industry, two in the Canadian Chemical Journal, one of which was repeated in "Canada" (London, Eng., and Toronto), and several in the Proceedings of the Maple Sugar and Syrup Co-operative Agricultural Association and in those of the Vermont Maple Sugar Makers' Association. The head of the department acted for three successive years as Associate Referee on

Maple Products in the Association of Official Agricultural Chemists and presented two reports on collaborative work which have been published in the Journal of that Association. In addition to these publications on the subject proper, a brief note by Mr. G. J. Van Zoeren describing a dip electrode, which appeared in the Journal of the American Chemical Society, is an outgrowth of the investigations on the detection of adulteration.

One of the first fruits of the investigations was the discovery of a simple and rapid method of detecting the adulteration of maple syrup with white sugar. This consisted in measuring the electrical conductivity of the syrup diluted to a more or less definite water content. Much of the subsequent work has consisted in determining what the natural limits of the conductivity value, thus originated, are in genuine maple syrup, in applying the method to maple sugar and in comparing it with the other methods used in the detection of adulteration. As a result of the reports referred to above, the Association of Official Agricultural Chemists has adopted this method as one of its tentative methods of analysis. The same reports led also to the Association's adoption on the same basis of a simple method of analysis which has been in use for many years in the Canadian Food and Drugs Laboratories (formerly the Laboratory of the Inland Revenue Department). This consists in treating the syrup (somewhat diluted) with basic lead

acetate solution and weighing the precipitate produced. The weight of the precipitate from 100 grams dry matter of the syrup is the "Canadian lead number" of the syrup. In comparison with the other tests commonly used in the detection of adulteration these two methods have been shown to have other advantages than mere convenience. In genuine syrups the conductivity value has less range of variation than the other analytical values. The Canadian lead number falls off rapidly when maple syrup is adulterated with refined sugar.

An attempt was made to devise a volumetric method with basic lead acetate, using electrical conductivity to determine the end-point of the titration. The method as published has enabled two of the collaborators to detect adulteration where other methods failed, but is perhaps too indecisive to be relied upon generally.

Maple sugar sand ("nitre") was found to consist mainly (65-80 per cent of the well-washed material) of calcium malate, the next most abundant component being silica (6-19 per cent). From this material malic acid can be conveniently prepared. Uses for this acid in food products and in bacteriological cultures and in the manufacture of artificial flavouring materials (for example, methyl coumarin) are developing rapidly as the acid becomes cheaper. Fortunately for these applications, though rather unfortunately for the maple industry, the optically inactive (racemic) variety of malic acid is now made very economically from coal-tar benzene. The manufacturers of the synthetic inactive acid claim that this is quite wholesome as a food material. If they are right the demand for the active natural acid will probably continue to be a very limited one, as maple sugar sand can hardly be collected and transformed into malic

acid with sufficient economy to enable it to compete with the synthetic product.

Comparison of maple syrups finished by the dipper, thermometer and hydrometer tests by practical makers have gone to show that the last-mentioned test gives less variation in the product as regards water content than do either of the others. The dipper test gives by far the most variable results of the three. However, those using the hydrometer test are inclined to over-concentrate their syrups—possibly because of the advice of buyers and the instructions given with the instruments furnished by buyers. Syrups with less than 33 per cent of water are apt to sugar in cold (or cool) storage. For this reason, as well as because a decrease in weight and, accordingly, in the producer's returns is involved, over-concentration is to be avoided. It is preferable, however, to under-concentration, i.e., concentration to a syrup with over 35 per cent of water, since that would render the syrup both illegal and fermentable. The maker should aim at finishing to a water content of between 33 and 35 per cent.

Some work has been done towards determining whether the instructions for use of the hydrometer in both hot and cold syrup cannot be improved, but the results so far obtained are not considered decisive enough to justify publication.

Evidence of inversion of the sugar of maple syrup during long storage has been sought in vain. The mottling of maple sugar in storage was found to be associated with an accumulation of moisture and salts in the darker spots. In three such sugars analyzed, the reducing sugar, ash, conductivity value, malic acid value and Canadian lead number were all found to be higher in the darker than in the lighter spots of these sugars.

SHEEP IMPROVEMENT MEASURES IN ONTARIO

THE Agricultural Representative for Renfrew county, Ontario, Mr.

M. H. Winter, reports the organization of a pure-bred ram club in that county. Twenty farmers who have not hitherto used pure-bred rams in their flocks have been given rams of the Shropshire and Oxford breeds. Nine dipping demonstrations in connection therewith resulted in twenty-five flocks, 1,000 sheep, being treated. Early in the season several meetings were held in the county to induce farmers to market wool co-operatively.

The formation of ram clubs in selected counties is the outcome of the policy of the Live Stock Branch of the Provincial Department of Agriculture, under which demonstration flocks of sheep have been established to the number of twenty. These flocks are operated on a share basis, the rams being supplied by the Department.

Under an agreement between the Live Stock Branch of the Provincial Department and the flock owners constituting a club, the Department undertakes to furnish the flock owner with a pure-bred ram free of cost, and after the ram has been used for two seasons, exchange

it for a second. It is provided that the flock owner shall dip his flock at least once a year, dock all lambs and castrate all male lambs. He is also required to co-operate in making an annual club shipment of wethers to a central market. The dipping, docking and castrating will be performed as demonstrations by field men of the Dominion Live Stock Branch. Arrangements for the joint shipment are made with the assistance of the representative. The agreement further provides for an annual report from the owner to the provincial department giving all essential data in regard to his flock.

The Department's offer is, it should be observed, limited to one club in a county, and that county must be one where the sheep industry is in need of special encouragement. Three clubs have hitherto been formed and supplied with rams, one in each of the counties of Lanark, Renfrew, and Lennox and Addington. It is believed that these demonstrations will clearly indicate the value of a pure-bred as compared with a scrub sire, and result in a better class of sheep being kept in districts that are backward in this respect.

GRADING OF PURE BRED RAMS—NOVA SCOTIA

THE grading of Pure Bred Rams in Nova Scotia for breeding purposes has proven very popular with the sheep breeders throughout the Province. Under the policy any breeder of pure bred sheep may have his rams graded and listed on application. The grading, in the past, has been done by a representative of the Dominion Live Stock Branch. Three grades are made, known as 3X, 2X, and 1X. The 3X being the highest grade, includes only really good individuals.

The rams are advertised in the press by both the Federal and Provincial Departments of Agriculture. In addition, a circular is issued stating the number

and quality of the rams offered for sale by the various breeders.

With the adoption of this policy, breeders have been able to sell, through correspondence, rams that otherwise could not have been disposed of. On the other hand breeders wishing to purchase rams have an opportunity of knowing what is offering, and can purchase with confidence.

The grading of rams is a step forward in the sheep breeding industry. It will do much to encourage the breeder and to prevent the slaughter of many useful individuals. With careful grading, the pure bred scrub will become a thing of the past or, at least, it will find its true value.

PART III

Agricultural Education and Related Activities

THE SCHOOL IN THE RURAL COMMUNITY

Lecture Delivered for the Summer School Students of the University of Alberta, 1921

BY G. V. VAN TAUSK, M.A., B.Sc., (OXON), B.S.A., COLLEGIATE INSTITUTE, MOOSE JAW SASK.

VARIOUS definitions have been given to education. For the purpose of this paper, we shall assume that education is the training that fits us for the duties of life—all the duties—the duties of making a living, the duties of home-making, the duties of parenthood, of social life, and of citizenship. Obviously, this implies not only the making of a living, but also living itself and the enjoyment of life. Applying this definition to education for rural life we find that it involves the following:—

1. Systems of education suited to local conditions and to every day experience of country children, thus relating them to the opportunities surrounding them and developing their intellects through a reasonable agricultural and natural history outlook.

2. The adaptation of the education of the boy and girl from fourteen to nineteen years of age toward productive efficiency along agricultural and home-making lines.

3. The training of teachers for the above.

The subject of the relation of the school with the rural community divides itself into two divisions. First, the rural community and its needs; second, the rural school and its possibilities.

The Rural Community Problem

A careful survey of the opinions of experts, the statistics of our various

government departments, and personal observations in rural communities show that the solution for the rural problem is to be found in knowledge, education and community organization and effort. This means:—

Knowledge.—That the various phases of the problem must be known. Surveys have to be made in a sincere, unbiased way of soils, farm management, markets, social conditions, institutions, etc.

Education.—The facts discovered must become the common property of the rural community, which necessitates a type of education both in public and high schools and college extension work which will carry to the farmer not only technical and business knowledge, but also direction and inspiration in social and community life.

Community Organization and Effort.—It is not sufficient to disseminate knowledge unless this knowledge is practically applied, which, however, is almost impossible without definite organization. To quote the Country Life Commission:—"The ultimate need of the open country is the development of community effort and of social resources."

Alexander MacLaren of the Ontario Agriculture College, says:—"Our task is to learn, if possible, how to build rural communities having community of spirit, purpose and action."

Ask yourself the following questions:

1. What, in your opinion, is the most important thing to be done for the general betterment of country life?

2. What is the rural problem?

3. Why is it so important?

4. Is there any connection between agriculture and other industries?

5. Which is the most important, better farming, better business, or better living?

6. In what respects has a city dweller's wife an advantage over the farmer's wife?

7. Reverse the question.

8. How could the social life of farmers' wives and families be improved?

9. Enumerate some features in which your rural community is lacking.

10. Show ways how they could be improved, etc.

No doubt there is such a thing as a rural problem, the solution of which, to a very great extent, will have to rest with the rural population. Other factors which should assist in solving this problem are the various government agencies, the question of good roads, of rural credits, of experimental work, and last, but not least, education must, in its ultimate analysis, be solved through legislative measures. This, however, does not exclude activity on the part of members of the community itself. It will be the purpose of the second and main part of this paper to show to what extent the rural school can become a factor in solving the rural problem.

The Rural School and Its Possibilities

The rural school in its capacity of an educational and social factor (which it should be) can assist in solving the rural problem. It can accomplish this, first, by a system of education suited to local conditions and to the everyday experiences of country children, thus relating to the opportunities surrounding them and developing their intellects through a reasonable agricultural and natural history outlook. This is absolutely necessary if we consider the gradual decrease

in pupils in the higher grades, which is due to other factors, one of which is the lack of interest on the part of the child in school studies. We all know how eagerly a child starts to school, how anxious he is to learn, and we also know that somewhere between the first and sixth grade and sometimes as early as the fourth grade he loses his enthusiasm. What is the reason? Why does all the enthusiasm, the desire, the interest dwindle down until it requires coaxing, bribing, scolding, and even the threatening of the compulsory education laws to keep the pupils in school until they reach their fifteenth year? Why is it that farmers are not anxious to send their children to school after they acquire the most elementary rudiments of the three R's? The child leaves school because he sees no connection between what we are teaching him and the life around him. A parent does not insist on his child going to school to a great extent for the very same reason. If the school would hold its pupils, it must intimately connect the school work with the everyday experiences of its boys and girls. The placing of agriculture, domestic science, manual training and such like practical subjects on the public school curriculum is an attempt to make over the course in such a way to meet the needs of the boys and girls and hold them in school until they are properly trained. We do not advocate the pure and simple practical education, but we most emphatically insist on the practical in education. It is not the purpose of the school to make farmers, cooks, carpenters, or what not, but it is the purpose of the school to show its pupils the dignity of labour, the whys and wherefores of various manual operations, and to create an intelligent and sympathetic appreciation with things surrounding the boys and girls.

Furthermore, from a purely psychologic point of view, the educational value of manual arts, if this term should be interpreted as the development of mental faculties, is as great as that of memorizing or abstract reasoning. Teaching by

doing is not any more a new idea in education, and why not do things which may have a practical value? In the educative process we always have to go from the known to the unknown, and there is not anything that a child knows better than the things which he eats and wears, the things about the home and the farm. When we talk about wheat, or cows, or aprons, or apple pie, or wood boxes, or ploughs, he understands us. We are on the boys' and girls' own ground. He visualizes our words. He knows what we mean. If we would teach him something new we must put it in terms of these or other familiar things. As we see, therefore, the great advantage of the practical in education is that it teaches in terms of the child's life. The average boy is interested in real things, but is not very apt to develop any enthusiasm about abstract phenomena; in fact, the child that is interested will not be dilatory; the very fact of interest gives him will and enthusiasm. The practical in education develops interest.

The boy who makes a flower box will not tell you he can do it in ten minutes. He knows it will take him approximately an hour. The girl who is educated through doing things will be a better judge of conditions and will be better able to estimate results. She will not propose impractical, impossible things. She knows they will not work out. Children through practical education are taught to think in terms of action. There are many other factors which can be brought about through the practical in education. For instance, it motivizes the school work. In teaching letter-writing we made a pupil write a note to the Department of Agriculture for a pamphlet. We were very much surprised how much better this letter was than the ones in his exercise book. In

asking him about this he answered: "A fellow has got to get a letter off if he is going to send it off." The moral is plain. We older people do not like to work without a motive. How can we expect a boy or a girl full of youth and enthusiasm to do so? This motivization of work reacts on other studies as can be seen by the results in the humanitarian subjects in technical schools. When we were teaching at an Agricultural School in Holland, Manitoba, the twelve pupils who devoted fifty per cent of their time to agriculture and only attended the high school for five months per year, made higher marks in the ordinary high school subjects than the purely academic students, although their previous education was of a lower standard than that of the prospective teachers or matriculants.

A certain strength is given to the pupils by doing worth-while work. When a boy tests his father's seed grain; when a girl irons a dainty dress or makes a cake, they feel that they are doing something worth while, something which carries with it responsibility, something which makes them a factor in doing the world's work; in short, it gives them strength through doing something worth while.

It may sound far-fetched, but the practical in education makes better citizens, not only economically and intellectually, but also physically, spiritually and morally. Physically because it takes the children out of their seats at least part of their time; spiritually, because it gives the child a vision, an outlook, a comprehension of the meaning and purpose of life; morally, because it breeds industry and an appreciation and respect for labour and labourers.

NOTE.—The remainder of this article will be published in the March-April issue.

SCHOOL AND HOME PROJECTS AND SCHOOL FAIRS, 1921

ONTARIO

BY Dr. J. B. DANDENO, INSPECTOR OF AGRICULTURAL CLASSES

THE following table shows the number of Public and Separate schools which carried on classes in Agriculture in Ontario from 1912 till 1920:—

Year	No. of Schools	With School Gardens	With Home Gardens
1912	101	.....	.....
1913	159	.....	.....
1914	264	208	56
1915	407	222	185
1916	585	324	261
1917	989	466	523
1918	1,020	588	432
1919	1,408	618	790
1920	1,648	702	946

The figures are not yet completed for 1921, but the number will reach at least 1,800 schools. Of these approximately 800 have school gardens.

The home projects consist largely of the management of garden plots, but other useful projects such as those mentioned below are undertaken:—

1. Management of a colony of bees.
 2. Making a collection of insects.
 3. Making a collection of weeds.
 4. Use of Babcock test on a herd during the summer.
 5. Management of home plot or garden.
 6. Growing and canning fruit.
 7. Growing and canning vegetables.
 8. Construction and care of a hot-bed.
 9. Incubating and raising a brood of chickens.
 10. Baking bread for exhibit at school fair.
 11. The production of mangel, turnip or cabbage seed.
 12. The testing of two varieties of a vegetable.
 13. The testing of the value of a commercial fertilizer.
- In the High schools practically every individual in the agricultural classes undertakes one or more projects.

The number of High schools conducting classes in Agriculture with school plots is given in the following table:—

	No. Schools	With Plots	No. Plots
1915			
January-June.	11	..	11
September-December. . .	15	..	15
1916			
January-June.	15	1	14
September-December. . .	20	1	19
1917			
January-June.	20	7	13
September-December. . .	21	7	14
1918			
January-June.	21	16	5
September-December. . .	26	18	8
1919			
January-June.	23	16	7
September-December. . .	30	23	7
1920			
January-June.	32	29	3
September-December. . .	25	24	1

The use of a plot as part of the school equipment in either Public or High schools in Ontario is relatively new, consequently, no provision was made years ago when school premises were secured, to obtain enough land for this purpose. Notwithstanding this handicap remarkable results have been achieved owing to the earnestness and enthusiasm of those in whose locality the need was explained. In a considerable number of instances land was supplied free, this showing in a tangible way an appreciation of work of this kind.

Small grants to Boards for equipment and to teachers for extra services in this connection, are made annually. With the large number of schools qualifying for grants, a considerable sum has to be set aside for this purpose by the Provincial Government. About

one-fourth of the money thus expended comes from the Federal subsidy.

Although the work connected with the home and school projects is essentially educational, very considerable financial returns have been made. These returns amount to much more than the grants expended.

The chief beneficial results obtained from School and Home projects are:—

(1) Inculcating a respect for manual labour.

(2) Development of some skill in management of a garden plot.

(3) Enlargement of the viewpoint as respects the source of supply of raw material for food and clothing.

(4) A linking up more closely of the interest of home with school, and of City with County.

(5) Promotion of improved gardens and lawns around the home.

For statistics as to School Fairs in Ontario, see article in Part II of this issue, entitled Ontario's Work under the Agricultural Instruction Act.—*Editor.*

NOVA SCOTIA

BY L. A. DeWOLFE, B.A., M.Sc., DIRECTOR,
RURAL SCIENCE SCHOOLS, TRURO

School Fairs.—School fairs have become such a common event that teachers often hold them as a part of the school routine without reporting them. It is, therefore, impossible to give the exact number of Fairs held in the province in 1921. Approximately 500 schools either held fairs or sent exhibits to a district or county exhibition.

Women's Institutes are becoming more and more active in organizing school exhibitions. In this organization lies greater hope than in the teachers; for the teachers continue to change every year, and the majority of them are young and inexperienced. The women, on the other hand, represent a more stable element in the community.

School and Home Gardens.—School gardens have their entrances and their exits with changing teachers. When a

school garden is successful, we usually find that a janitor cares for it during the summer. As our rural schools have no such service in vacation, the garden must be on the home plot.

Many earnest teachers induce their children to make gardens in the spring; but with the teacher's departure in June, the garden usually departs too. When an incompetent teacher succeeds her in August, such a common place affair as a garden is not even inquired about. Therefore, the existence of such a garden, even for a brief period, is not reported.

Though such spasmodic efforts are unrecorded, about 4,000 children make gardens at home each year, and exhibit their products at the Fair. The Women's Institutes frequently furnish seeds for such gardens. Last spring we gave away flower seeds saved from our Normal College school garden, which, if bought, would have cost fully \$200.

School Clubs.—School Clubs are common, though comparatively few of them are strictly agricultural clubs. The teacher usually prefers to organize a general club with a varied programme. At some meetings of the club an agricultural programme is given. Frequently, too, some agricultural topic is debated by the youthful citizens.

Personally, we have encouraged this sort of club rather than purely Poultry, Pig, or Potato clubs. We feel that a knowledge of how to grow pigs is not sufficient for our future citizens. The champion potato grower may possibly be absolutely ignorant of the laws of health, community civics, or even the rules of ordinary good manners. Through the school clubs, however, our children learn not only proper food rations for pigs but also for people. They learn how to cook potatoes and how to eat them as well as how to grow them. Health clubs are probably more popular than any others. Without healthy, happy, properly nourished workers, agriculture cannot prosper.

NEW BRUNSWICK

The Director of Elementary Agricultural Education for New Brunswick, M. A. C. Gorham, reports on the School Fair and the School Home Garden work in 1921, as follows:

School Fairs.—The School Fair movement has grown during the past season not only in extent but also in popularity. The number of fairs has doubled since 1918. The public meeting, generally held in connection with each fair, has been well attended by the grown-ups as well as the children. Many of the parents have expressed themselves as greatly pleased with this educational work.

There has been marked improvement in the organization of fairs from the teachers' standpoint. They are studying more and more the art of securing interest and getting boys and girls to do things for themselves. Committees have been formed to carry on the work, thus lightening the task of the teacher and distributing the responsibility.

In many districts the Domestic Science exhibits played a large part in the success of the fair. In some cases canning, preserving, cooking, sewing, crocheting, and knitting were included. At the Sussex High School, there were exhibited over seven hundred jars of fruit and vegetables.

Many schools have held meetings bringing together their teachers for the purpose of discussing and planning the nature study and agricultural work with a view to determining what they will prepare for the school fair next fall.

Home Plots.—That the home plot has proved a success is evidenced in the fact that the movement has had a steady growth from 2,404 plots in 1919 to 5,000 plots in 1921. Free seed was supplied by the department, also instructions to assist the pupils in laying off their plots, planting, cultivating, thus tending to keep plots uniform. This makes for a better basis for competition, the summer

supervisors being able to make decisions with a greater degree of satisfaction.

Although the past season was a trying one for gardens, the boys and girls had exceptional results with their plots. Many learned the great value of moisture in the soil and how it can be conserved by cultivation.

School Gardens.—With one or two exceptions school gardens were a greater success than ever. Besides the districts where gardening has been carried on regularly, a number of districts which had to discontinue for one or more terms on account of not being able to secure a certified teacher have again notified us that they desire to carry on the work, showing their appreciation of this form of educational endeavour.

SASKATCHEWAN SCHOOL EXHIBITIONS

BY FRED W. BATES, B. A. M. Sc., DIRECTOR OF RURAL EDUCATION ASSOCIATIONS AND SCHOOL EXHIBITIONS

The season just closed has been the most successful in the history of the school exhibition movement in Saskatchewan. At some 325 points steps were taken toward organization, but the extremely wet weather and bad roads during September resulted in many postponements and cancellations. Notwithstanding these drawbacks, about 290 exhibitions were held, which is a very satisfactory increase, as shown by the following table:

Year	Number of exhibitions reported
1909..	1
1914..	14
1915..	42
1916..	84
1917..	129
1918..	175
1919..	207
1920..	260
1921..	290

Sufficient reports have not yet been received to give complete statistics, but the average number of exhibits and schools competing at each point has been well maintained. It is estimated that 2,000 schools took part, with 42,000

THE AGRICULTURAL GAZETTE OF CANADA

of the 62,000 pupils enrolled making 150,000 exhibits, an average of 537 exhibits per centre.

There are now 175 Rural Education Associations in active operation, and they continue to be the most efficient organization for carrying on school exhibitions. They have also proved to be most popular in conducting Boys' and Girls' Club activities. Of the 64 clubs reported in another article in this issue, 48 were organized under Rural Education Associations, 4 by Agricultural Societies, 4 by School Exhibition Associations and 8 under independent

management. The School Exhibition and Boys' and Girls' Club work are now recognized as the most important departments of the Rural Education Association.

SASKATCHEWAN BOYS' AND GIRLS' CLUBS

BY HARRY SAVILLE, B.S.A., ORGANIZER OF BOYS' AND GIRLS' CLUBS

Club work having now been conducted for almost two years by the Department of Education, figures for these may be compared. The number of clubs, branches and members is:—

	Clubs	Branches	Boys	Girls	Total
1920..	31	95	607	491	1,098
1921..	64	247	2,013	1,852	3,865

Many members engage in more than one project and there has been a corresponding increase in these. Farm Boys' Camps are still under the control of the Extension Department of the

University, and the number of boys attending the camps and preparatory short courses is not included in the following table:

	Calf Raising	Pig Raising	Sheep Raising	Colt Training	Poultry Raising	Potato Growing	Garden- ing	Canning	Stock Judging	Others	Total
1920..	99	114	41	20	291	243	381	102	13	..	1,304
1921..	519	412	102	188	1,131	973	1,657	539	202	494	6,217

As anticipated, there was a rapid development shown during 1921. Depression in the livestock market tended to discourage the raising of calves and pigs. Gardening continues to lead as the most popular activity with poultry raising a good second. A relative increase in the number of girls taking part is gratifying, and especially the growing interest in the canning of fruits and vegetables.

Several large banks co-operated splendidly and through their local managers gave valuable assistance. Through the Rural Education Associations all elements of the community are being brought into immediate touch, and our teachers are coming to recognize in these activities an important adjunct to their school work.

ALBERTA SCHOOL FAIRS

Over one hundred School Fairs were held in Alberta in 1921, at points scattered all over the province. A feature of the work worth noting was that, at the Calgary Winter Fair in November, the children from the Lougheed and Sedgewick School Fair districts took prizes in the classes for children, amounting to \$845 in cash, three medals, a cup, and a pig; and the children of the district from Camrose to Hardisty took nearly half of the prize money offered in the Boys' and Girls' classes.

The Edmonton and Calgary exhibitions, both at their summer and winter fairs, feature live stock work for boys and girls, and bring out wonderful exhibitions in the calf-feeding, pig-feed-

ing, and sheep-feeding classes. These events have become attractive features of these exhibitions.

At the fairs held in 1921 the exhibits were larger in number and better in quality than in previous years. Encouraging improvement was noticeable in the live stock classes, in school work, and in the work of girls such as sewing, cooking, canning, etc. Every fair held sent in a favourable report. The number of entries ran from 250 in smaller sections, to over three thousand entries at the Leduc fair. In the Leduc Fair

twenty-two schools with 440 pupils competed for the many prizes. At the Queenstown fair, in Southern Alberta, twelve schools with 225 pupils, made 900 entries. At Claresholm fourteen schools with 330 pupils, came forward with 700 entries in the various classes. These few examples are quoted to show the interest in the work.

All the fairs were well attended and at many of them addresses were delivered by men prominent in agricultural and educational circles.

SCHOOLS OF AGRICULTURE AND DOMESTIC SCIENCE FOR ONTARIO

Three Months' Courses in Elementary Agriculture and Domestic Science
for Farm Boys and Girls Instituted in Four Rural Districts by
the Ontario Department of Agriculture

BY L. STEVENSON, B.S.A., SECRETARY AND SUPERVISING DIRECTOR, DEPARTMENT OF AGRICULTURE

HOW can we reach the boys and girls on the back concessions?

How can we deliver the messages of modern agricultural thought to rural minded youth who have not had the opportunity of securing more than the offering of the rural public schools? How can we reach those who have passed school age and now hunger for further enlightenment but hesitate at the thought of attending an established long term institution? What can we offer by way of education to the rural minded youth of to-day that will aid them to better rural citizenship? Why does the drift of rural youth to the urban centres increase? These and similar questions are frequently heard. Such indicate that we have not been doing for the rural youth all that we might have done.

Perhaps we have been unfair to the rural minded boys and girls in that we have continued to use in our rural public and high schools subjects and methods of study that have not given the train-

ing most needed to prepare the youth of the country for rural citizenship. Perhaps we have been asleep for forty years on matters pertaining to the early education of our rural boys and girls. At all events there is something very much out of adjustment.

Our rural schools have largely failed in that they have not aided the rural minded boy or girl to continue to be rural minded. When we compare the methods and the teaching of the Ontario rural schools with the methods and the teaching of the Danish rural schools, differences are noted. When we compare the product of the Ontario farms that is being offered for sale in the British markets with the product of the Danish farms on the same British markets, considerable differences in grades and sale prices are noted. The grade and sale price sheets show that the Denmark farm products are largely of the first grade and sold at the highest price; that Ontario's farm product, while

giving a small percentage of first, contains an altogether too large proportion of the lower grades and prices. Does this mean that rural Ontario's percentage of one hundred per cent efficient farmers is correspondingly low? If the efficiency of the Ontario farmer is so much lower than the efficiency of the Danish farmer, why the difference? Should we go back to the beginning and equip the rural schools so that such would give the boys and girls a better start toward one hundred per cent successful rural citizenship or should we continue as we are? Changes come slowly, but when our rural schools are developed from the rural viewpoint and attain the efficiency in training the rural children for a rural life that now characterizes the Danish schools, there will be less need for old age education in this province and there will be greater success and attraction in rural life.

One thing is very sure, we cannot change the educational system that has been developed in this province, and made applicable in all features to both urban and rural schools, in a day or a year. But while waiting for the desired changes in our provincial educational system in its application toward rural schools we can at least do something toward bridging over the gap until the day comes when we will have agricultural public schools and agricultural high schools in agricultural Ontario.

With the thoughts and implications of the preceding paragraphs in mind, the writer of this article has taken up and developed an idea that originated with the Hon. Manning Doherty some twenty-five years ago: "A School of Elementary Agriculture and Domestic Science to meet the needs of the boys and girls living on the back concessions where the opportunity for education had been very limited." Schools that could be held in the villages during the winter period, utilizing the buildings and equipment available insofar as possible. This meant that the people of a rural district, the Department of Agriculture and its

extension service, the District Agriculturists, would have to adopt a workable scheme agreeable to all and likely to be effective in operation.

To this end an outline of a three months' course in elementary agricultural and domestic science studies was prepared, and the District Agriculturists for a number of counties were called in to the head office by Mr. Reginald Duncan, Director of Agricultural Representatives, for the purpose of considering the workability and desirability of holding such a school in their respective counties. Four District Agriculturists, namely, Mr. W. G. Marritt, Wentworth county, Mr. J. A. Carroll, Peel county, Mr. R. A. Finn, Middlesex county, and Mr. S. B. Stothers, Huron county, agreed to undertake the responsibility of such a school. This point disposed of, the District Agriculturists returned to their counties, met the people likely to be interested in the project, held a few meetings, consulted the authorities with the object of securing suitable class room accommodation and equipment with which to carry on a successful school in elementary agriculture. The project was well received in the various counties by the municipal councils, boards of agriculture and school boards, churches, and other organizations. Suitable buildings were offered, lighted, heated and furnished. The student response on opening day was liberal, one county (Peel) reporting 95 young men and women in attendance. The registration during the first two days of the school indicated that more young people were desirous of becoming students than the instructors would be able to handle to best advantage.

Buildings such as municipal halls, school buildings, Militia Department armouries, are being used by the four schools being conducted this year. At Waterdown, in Wentworth county, the old high school building and the exhibition building are being used; at Strathroy, in Middlesex county, the new armory building is being used; at Wing-

THE AGRICULTURAL GAZETTE OF CANADA

ham, in Huron county, the municipal hall and armory building are both being used. At Bolton, in Peel county, two classrooms were arranged for and fitted up in industrial buildings. The instruction is given at all the schools in Animal Husbandry, Field Husbandry, English and Mathematics by local teachers, that is, the District Agriculturist teaches Animal Husbandry, the Assistant District Agriculturist teaches Field Husbandry, and a capable, qualified local teacher undertakes the instructional work in English and mathematics. For all other subjects, some eighteen in number, a strong faculty of specialists has been engaged. Many of the specialists are well-known as workers on the extension staffs of Mr. G. A. Putnam, superintendent of Institutes, and Mr. R. S. Duncan, Director of Agricultural Representatives. The management of each school is under the District Agriculturist of the county in which the school is held, who is in turn responsible to the Director of Agricultural Representatives. The timetables have been arranged by the Director of Agricultural Representatives so that the teachers move from school to school in regular order for the time allotted to each subject. The same

instruction is being given at all four schools.

The course in Agriculture comprises the study of the following subjects: Animal Husbandry, Field Husbandry, Horticulture and Vegetable Growing, Soils and Fertilizers, Apiculture, Farm Mechanics, Poultry Husbandry, Farm Dairying, Farm Management, English and Mathematics, Farm Forestry, Agricultural Botany, Economic Entomology, Civics, Rural Organization and Co-operative Marketing, Veterinary Science, Bacteriology, Birds in relation to agriculture.

The course in Domestic Science includes sewing and millinery, home nursing, foods and cookery, laundering and household administration. Domestic Science students who cannot spend three months at the course may spend one month and get a full course in the subject in which they are most interested. Students of both sexes will take the lectures in dairying, civics, rural organization, poultry and horticulture.

At the time of opening, the prospect for the success of these four experimental schools was indeed bright, two hundred and seventy young men and women having registered.

AGRICULTURAL COLLEGE ENROLMENT, 1921-22

ONTARIO AGRICULTURAL COLLEGE

Agriculture

1st year Associate..	59
1st " Degree..	42
2nd " Associate..	43
2nd " Degree..	43
3rd "	147
4th "	114
Total..	448

Domestic Science

Junior Normal Course..	18
Senior Normal Course..	12
Junior Associate Course..	31
Senior Associate Course..	23
Junior Institutional Management..	12
Senior Institutional Management..	12
Homemakers' Course..	36
Total..	144

ONTARIO VETERINARY COLLEGE

The number of students enrolled at the Ontario Veterinary College for the

year 1921-22 was 86, of whom 65 were British subjects, coming chiefly from Ontario, Nova Scotia and Western Provinces, and one or two from Newfoundland and the British West Indies.

MACDONALD COLLEGE, QUEBEC

Agriculture

1st year..	11
2nd "	5
3rd "	25
4th "	19
Graduate Students..	4
Total..	64

Household Science

Degree Course—3rd year..	6
Institution Administration, seniors..	7
Institution Administration, juniors..	11
Homemakers' Course..	31
Total..	55

THE AGRICULTURAL GAZETTE OF CANADA

SCHOOL OF VETERINARY MEDICINE, MONTREAL

Enrolment for 1921-22, 20 students.

MANITOBA AGRICULTURAL COLLEGE

Agriculture

1st year Diploma	49
1st " Degree	20
2nd " Diploma	17
2nd " Degree	14
3rd " Diploma	22
3rd " Degree	19
4th " " " " " "	111
5th " " " " " "	13

Total.. 165

Home Economics

1st year Diploma	23
1st " Degree	12
2nd " Diploma	6
2nd " Degree	13
3rd " " " " " "	24
4th " " " " " "	9
5th " " " " " "	6

Total.. 93

UNIVERSITY OF SASKATCHEWAN, COLLEGE OF AGRICULTURE

Agriculture

Degree Course	71
Associate Course	80

Total.. 151

UNIVERSITY OF BRITISH COLUMBIA, COL- LEGE OF AGRICULTURE

Degree Course—Agriculture

1st year	28
2nd "	14
3rd "	12
4th "	10
Graduates	4

Total.. 68

UNIVERSITY OF ALBERTA, COLLEGE OF AGRICULTURE

Agriculture

3rd year	34
4th "	13
5th "	8
Graduate's work	2

Arts and Agriculture

Combined six-year Course.. 13

Total.. 70

The Associate work is done at the
Schools of Agriculture.

NOVA SCOTIA AGRICULTURAL COLLEGE

Degree Course—Senior A	20
Degree Course—Senior B	9
Practical Course—Junior A	23
Practical Course—Junior B	21

Total.. 73



School garden and officers of the School Garden and Progress Club, St. Anthony's
(Separate) School, Kitchener.

PART IV

Special Contributions, Reports of Agricultural Organizations, Publications and Notes

FOREST PROTECTION AND TREE PLANTING

EDUCATIONAL enterprises sometimes take novel forms but few educational novelties seem to have proved more successful in gaining public attention than the especially-equipped railway coaches employed by the Canadian Forestry Association in its educational campaign in Forest Fire Prevention and Tree Planting.

One of the coaches, stripped of the usual seats, is packed with graphic exhibits, including models of forests, showing the devastation of forest fires, fire protection apparatus, wireless equipment, electrically lighted show cases displaying hundreds of strange articles made from wood, such as imitation silks and leather, wood distillates, etc. There are electrical illusions giving transformation effects from a beautiful forest to a burned ruin, and by means of scores of beautiful transparencies illuminated by electric globes the aesthetic side of forest preservation is made highly impressive. In short, the purpose of the Forest Exhibits Car is to drive home the lesson that forest fires are a public enemy, affecting the personal welfare of every citizen of Canada.

During its tour of six months, more than 120,000 people visited the Car. The trip covered approximately nine thousand miles. Every evening, motion picture lectures were given by English or French lecturers.

The Association's second travelling enterprise, the Tree Planting Lecture Car, travelled eight thousand miles in Manitoba, Saskatchewan and Alberta and fifty thousand people attended the

tree planting lectures and demonstrations given by Mr. Archibald Mitchell, a well-known Western expert, and his assistant.

The purpose of the Tree Planting Car is to take information and inspiration through a novel and interesting medium right to the front door of the settler who has greatest need of such help. The fact that the enterprise was connected with no government or commercial interest and was purely a citizen's movement gave it a particular appeal. Mr. Mitchell, the chief lecturer, has a great gift for rousing the interest of farmer audiences and a thorough mastery of the whole subject of tree planting under peculiar prairie conditions, gained by thirty years' experience.

The Lecture Car was built with a sloping floor and special seating, so as to contain from 125 to 150 persons and at every stop, two illustrated lectures and demonstrations were given. In numerous instances, municipalities were supplied with complete working plans for a local park, drawn up according to local requirements and all sorts of societies were given practical help in improving school and church grounds.

The inspirational effect of such a tour cannot be over-emphasized, for tens of thousands of men, women and children to-day have an intelligent comprehension of the value of shelter belts of trees in home beautification, in the prevention of soil drift, the protection of buildings and live stock and the improvement of moisture conditions.

Even in a highly unfavourable business year the Canadian Forestry Association succeeded in financing its educational enterprises from private sources

with the aid of a few small government grants. The work will be continued throughout the winter through other channels developed by the Association.

NEWS ITEMS AND NOTES

A campaign has been undertaken by the Dominion Department of Agriculture, with the object of increasing the volume and improving the quality of Canadian bacon for the English market. A series of advertisements emphasize the three outstanding features of the export bacon trade: (1) That Great Britain is Canada's only export market, (2) That Denmark is a keen competitor, and is now increasing her volume of trade, while Canada is not exporting bacon at as high a rate as in 1920, and (3) That by sending forward a steady volume of high quality bacon, Canada can maintain the favour of a discriminating consuming public, which was gained during the war years.

Provision has been made by Order in Council whereby the sum of twenty-five thousand dollars is set aside as the Dominion Government's allotment towards assisting farmers in the dry area of Southern Alberta. A joint agreement has been reached between the Dominion Government, the Provincial government and the railways whereby feed will be transported free into the districts which suffered from drought during the summer of 1921 and cattle will be shipped out to feeding points and returned freight paid. Each party to the arrangement will contribute equally. Owing to the comparatively small area affected, the present allotment is considerably less than that set aside in 1919 and 1920. In 1920 no less than \$350,000 was set aside by the Dominion for this purpose, and a similar amount in the year previous.

Mr. Criddle, in charge of the Dominion Entomological Laboratory at Treesbank, Manitoba, has completed a survey of the grasshopper infested areas, and reports that the roadside grasshopper has ceased to be a menace in the southern portion of Manitoba, but the eggs of *Melanoplus* have become more numerous.

The grasshopper situation in the province of Alberta is by no means improving, and the area infested increased tremendously last year. Mr. Seamans, of the Lethbridge laboratory, reports that grasshoppers have deposited eggs in large numbers as far east

as the Saskatchewan boundary. In some localities there are as many as 5,000 eggs to the square foot, and the average is about 2,500. In certain sections where there has been an increased acreage of fall rye, the grasshoppers have already destroyed from 10 per cent to 25 per cent of the crop. Mr. Seamans has also been conducting a series of meetings on grasshoppers and cutworms.

The wheat stem sawfly situation is very serious in Manitoba, as the infestation in that province covers over 8,000 square miles. Mr. Criddle is of the opinion that the provinces of Manitoba and Saskatchewan will have a loss in excess of five million dollars as a result of the work of that insect in 1921.

The Division of Botany at the Central Experimental Farm reports that the Green Mountain Potato Seed Source Test at Long Island, N.Y., has been harvested and the results tabulated. It is interesting to record that the five Prince Edward Island samples entered in the test under the supervision of the Dominion Pathological Laboratory at Charlottetown, gave good results, two of the samples being second and third on the list of sixty-two entries. Checks were planted every tenth row with seed from ordinary market stock.

By taking 100 as representing the average yield per cent of the checks, there were 33 samples which scored that figure or higher. The highest score was made by a sample from Vermont, with 139. The Prince Edward Island samples yielded 128, 126, 112 and 103 per cent respectively of the average check, and in order of merit were placed 2nd, 3rd, 14th, 15th and 31st on the list. By averaging the yields of marketable potatoes per acre for each State or Province we get the following figures: Prince Edward Island, 291; Vermont, 283; Maine, 280; New York, 274.

The demonstration brought out very clearly the influence of such diseases as mosaic and leaf roll on yields. The ten highest yielding strains showed an average of a little over 0.5 per cent of each of these

THE AGRICULTURAL GAZETTE OF CANADA

diseases, whereas the ten lowest yielding strains had an average of 31 per cent mosaic and 6.5 per cent leaf roll.

The new laboratory of Plant Pathology of the Division of Botany, Experimental Farms Branch, which is being established at Summerland, is now nearing completion. It is very finely situated on a site overlooking Lake Okanagan. The building itself is a good frame structure and provides ample room for all present needs.

Summerland is the centre of a very rich horticultural district, and problems are mostly those of the orchard. Fire Blight and Powdery Mildew on the apple are the diseases that are giving most trouble at the present time. Physiological diseases, such as Stippen, Cork and Drought Spot, are often met with and appear to be of considerable importance throughout the valley.

Western yellow blight of tomatoes is one of the worst troubles in vegetables that has come to notice so far. It is believed that the casual organism is a fusarium that lives over in the soil, and no satisfactory method of control has yet been brought forward.

The Dominion Fruit Commissioner has been advised that it is the intention of the Daily Mail of London, England, to hold an Imperial Fruit Show in 1922 on a much more extensive scale than last year. There is no doubt that Canada will be well represented.

The Publicity Division of the Experimental Farms Branch of the Dominion Department of Agriculture is inaugurating a Lantern Slide Loaning Bureau. Slides are now being made for two subjects, "The Planning and Care of the Farm Home Grounds," and "Poultry Keeping." Both of these sets will shortly be ready for circulation.

The receipts of milk at the Finch Dairy Station operated by the Dominion Dairy Commissioner, totalled, to the end of September, 5,467,939 pounds as against 4,646,949 pounds for the same period in 1920, being an increase of over 17 per cent.

In order to further advance the training of students for the profession, it has been decided to transfer the Ontario Veterinary College from Toronto to Guelph, where it will be possible to establish a closer alliance with agriculture than has been practicable in the past.

The Ontario Department of Agriculture has installed a pre-cooling and cold storage for apples and other fruits at Brighton, Ont. The plant commenced operating on September 10, and the growers in the district are said to be taking full advantage of it. The building contains three storage rooms, 50 x 60 feet,

with a capacity of 10,000 barrels, and a basement capable of holding 5,000 barrels. Should the enterprise prove a success and the growers avail themselves of the facilities offered, additional plants will be built in other fruit districts.

Each year from 1914 to 1921 the courses of one month in Agriculture and Domestic Science held in Peel county, Ontario, under the direction of the Agricultural Representative, Mr. J. A. Carroll, have increased in popularity and attendance. In the former year, 25 young men attended; in 1921, the enrolment was 50, and the total for the eight years was 700. The class in Domestic Science was not organized until 1916. Since then 800 young girls have taken the course. The only criticism has been that the courses are too brief and afford merely an introduction to the subjects taken up.

The Ontario Department of Agriculture is establishing pure-bred ram clubs in three counties in Eastern Ontario, as demonstrations of what better blood means to the sheep raiser. One club is being started in each of Renfrew, Lanark and Lennox and Addington counties.

It is the intention of the Government of Ontario to put the Dairy Standards Act in force next year. Briefly, this measure provides for the paying of all dairy products on a quality basis, particularly in connection with the purchase of whole milk by cheese factories and creameries.

The work of beautifying the Provincial Highways in Ontario, which is under the direction of Mr. H. J. Moore, Forester, Department of Public Highways, includes the planting of trees along each side of two-thousand miles of roadway. The trees are largely native and are spaced 175 feet apart. Small areas at intersections are graded, planted with trees and shrubs and laid out as parks. Old gravel pits and quarry areas are to be reforested with pines and other trees, as likewise are all extensive cuts and the sides of hills which have been rendered necessary by engineering activities. All barren and unsightly slopes along the Highways are now being landscaped, or are in process of being forested wherever such practice is proper. During the fall planting season of 1920 and spring and fall of 1921 about 130 miles of trees and two small park areas were planted. The work of planting is performed by labour obtained in the Municipality in which the work is being done, in each case under a foreman specially instructed and familiar with the work.

All mutilation of trees along the Highways is prohibited; no company or individual may prune without permission. The Forester is

THE AGRICULTURAL GAZETTE OF CANADA

allowed to advise, when requested, re the planting of trees and their care along county roads and in municipalities; also to deliver lectures on planting, pruning and allied subjects.

A provincial ploughing match, under the auspices of the Quebec Ploughmen's Association and the Quebec Department of Agriculture held in October last, near the city of Quebec, was the first of its kind in the history of the province. The event brought together some 800 farmers, and the various competitions were keenly contested.

The general health of live stock in the province of Saskatchewan continues to be good, no serious outbreaks of any description having occurred during the past year. Hog cholera has been effectively checked, glanders in horses is a rare occurrence, the mange area has been eliminated, and only a very few cases of mange, all of which are in quarantine, exist in the province. Efforts of the Dominion Department to expose and reduce tuberculosis and of the Provincial Department to eliminate contagious abortion are proving of great assistance to stockmen.

The Extension Department of the Saskatchewan College of Agriculture is arranging to conduct a series of short courses in agriculture this winter throughout the province in co-operation with the Agricultural Societies. These courses are of one, two and three days' duration, and will deal with practical farming topics. Courses for women have also been arranged to be held in conjunction with the courses for men. Each evening of the course a public lecture will be given and a moving picture shown.

The Dairy Department of the University of Saskatchewan is offering a three weeks' Short Course for Creamery Butter-makers, from January 23 till February 11, 1922. This course is intended chiefly for men who have already had practical experience in a creamery, and will only be given if a sufficient number of students apply.

The Director of the Extension department of the University of Saskatchewan states that, during the past three seasons, nearly all poultrymen whose flocks have been culled have expressed their appreciation of the work. Steady improvement is shown in the quality of the birds and, where records have been kept, in egg production, as well. Agricultural Societies applying for inspectors to cull flocks of pure bred poultry are being asked to arrange for one of the best poultrymen in the district to accompany the inspector and thus gain experience. At a later date these assistants will be invited to attend a short course of two weeks at the University

in Selection Methods and Judging. Those who successfully pass the tests will be permitted to judge flocks in their respective districts and to charge a nominal fee for the service.

Plans are again being made to provide a very limited number of courses in Gas Engineering, of two weeks' duration each, this winter, under the auspices of the Agricultural Societies. Five such courses were held during the winter of 1918-19 and six during the first three months of 1921. These were very popular and invariably successful in every particular.

The average annual attendance at the Olds, Alberta, School of Agriculture during the seven years of the school's operation has been 141 students, the average number of male and female students being 47 and 94 respectively. The smallest attendance was in the opening year 1913-14, when 104 students were enrolled, and the largest in 1920-21 with 163. The record indicates a yearly increase, which has been maintained in spite of recent adverse farming conditions, thereby giving evidence that the farming community appreciates the school and recognizes the value of the instruction given.

The Great Plains Section of the American Society for Horticultural Science held their annual meeting for 1921 in Eastern Canada where an opportunity was afforded for studying the collections of hardy material at Canadian Farms and Stations. The section comprises experiment station workers, who are concerned primarily with the development of hardy varieties in the various stations of the Upper Mississippi Valley. The Association met at St. Catharines in the Niagara Fruit district. After inspecting the Vineland Station and the district generally, the party visited the Ontario Agricultural College, the Central Experimental Farm, Ottawa, MacDonald College, and the Institute of Agriculture at Oka.

AGRICULTURE IN BRITISH COLUMBIA HIGH SCHOOLS

The announcement has recently been made that agricultural courses have been inaugurated in three additional high schools in British Columbia, namely at Salmon Arm, Penticton and Summerland. Agriculture had previously been taught in ten high schools in the province. In appointing District Supervisors of Agricultural Instruction, the Department of Education has continued the policy of selecting agricultural graduates with teaching experience, and under an arrangement with the Department of Agriculture, they function as Agricultural Representatives in the districts they represent.

THE AGRICULTURAL GAZETTE OF CANADA

At Salmon Arm the new work is in charge of W. H. Grant, B.S.A., who comes from Ontario, whilst T. A. Jones, B.S.A., also an Ontario man, will conduct the work in the Penticton and Summerland districts.

Mr. Grant, who is the son of the Hon. R. H. Grant, Minister of Education in Ontario, was born on the farm and is a graduate of the Ontario Agricultural College. He has had several years' experience as a teacher in Ontario schools.

Mr. Jones was born and reared in the Niagara peninsula of Ontario. He has a knowledge of fruit-growing, which will doubtless prove of great value to him in carrying on his new work in the south Okanagan towns. Mr. Jones is also a graduate of the Ontario Agricultural College, and a specialist in horticulture.

ONTARIO AGRICULTURAL COLLEGE

For a number of years past it has been the practice to take all the students in fourth year agriculture at the Ontario Agricultural College on a judging trip to live stock farms in the vicinity of the institution. This year for the first time the entire class was asked to register and take a week's extended trip before the term proper began. Practically the whole of them responded, fifty-five men making the trip and paying their own expenses. From among them the judging team to represent the college in the International Judging Competition at Chicago will be selected.

During the week the herds and flocks of six leading breeders were inspected and judged by the students, with reasons being given for the placing. The breeds included Shorthorn, Hereford and Angus cattle, Percheron horses, and Southdown, Lincoln and Romney sheep. Later on, the class will be taken to inspect other herds and additional breeds including swine.

The Memorial Hall at the Ontario Agricultural College, will take the form of an auditorium in the Gothic style of architecture, capable of seating 1,200 persons and costing about \$100,000. It will be built

entirely of Guelph limestone and will stand on the main campus. The first sod was turned on November 12 by the Minister of Agriculture for the Province, Hon. Manning Doherty. Owing to difficulty and delay in starting operations, the entire student body undertook the work of excavation.

MACDONALD COLLEGE

Raymond L. Conklin, D.V.M., Cornell, has taken up the duties of Veterinarian at Macdonald College in succession to Dr. Savage, who has been appointed Professor of Animal Pathology at the Manitoba Agricultural College. Dr. Conklin saw war service overseas in the United States Army Veterinary Corps, and has done work in the investigation of infectious diseases and in tuberculosis eradication for the New York State Department of Agriculture.

L. G. Heimpel, B.S.A., is in charge of Agricultural Engineering at Macdonald College during the absence of Geo. E. Emberley on leave. Mr. Heimpel has been in the service of the Ontario Department of Agriculture for six years—four years in drainage extension work and lecturing on farm power and machinery, one year as farm manager at the Ontario Agricultural College, and in 1920, in charge of Farm Engineering at the Agricultural School, Kemptville, Ont.

The Honorary Advisory Council for Scientific and Industrial Research, Canada, has given the chemistry department of Macdonald College a grant towards the expense of an investigation of soil acidity. Surveys made by fourth year students of past years have shown that acidity is very common in the soils of Quebec province. It is the intention to study the various methods proposed for the measurement of soil acidity and, having selected one or two, to make further surveys in the province. The relation of acidity to crop growth will also be studied with a view to deciding whether full or partial correction of acidity should be attempted in soils devoted to specific crops or crop rotations.

ASSOCIATIONS AND SOCIETIES

CONFERENCE OF DAIRY PRODUCE GRADERS

The sixth Dominion Conference of Dairy Produce Graders was held in Toronto, on November 16 and 17, 1921, under the auspices of the Dairy and Cold Storage Branch of the Dominion Department of Agriculture. The object of these conferences is to promote uniform standards and grading of dairy products throughout the Dominion. Besides the official delegates, one from each Province, whose expenses are paid by the Department, a number of voluntary delegates and commission dealers were present.

The Dairy Commissioner, Mr. J. A. Ruddick, gave an address on grading dairy produce for export. Samples of June butter from the Dominion Educational Butter Scoring Contest, and other samples provided by the Toronto Produce Exchange, were scored and discussed. The type of butter most suitable for the Toronto market was taken up and explained for the guidance of graders.

QUEBEC POMOLOGICAL AND FRUIT GROWING SOCIETY

The Quebec Pomological and Fruit Growing Society held its annual meeting at Macdonald College on December 1 and 2, 1921.

J. R. Marshall, of Abbotsford, was elected president, to succeed the retiring president, J. H. Lavoie, of Quebec. The other officers elected were, Hon. President, C. E. Petch, Hemmingford; Hon. Vice-President, J. H. Lavoie, Quebec; Vice-President, J. M. Talbot; Sec.-Treasurer, Peter Reid, Chateaugay.

It was decided to hold the next meeting of the Association at Deschambeault, Que., where the provincial department has been operating a demonstration fruit farm and nursery for the last three years.

ONTARIO BEE-KEEPERS

The Ontario Bee-Keepers' Association held its annual convention in Toronto late in November. A resolution was passed approving of the principle of co-operative marketing of honey and the grading of the product, and a committee was appointed to gather all information possible and to report at a later date.

The officers elected included: President, E. T. Bainard, Lambeth; Secretary Treasurer, Professor F. E. Millen, Ontario Agricultural College, Guelph.

ONTARIO POULTRY ASSOCIATION

This association held its annual meeting at Guelph on December 3. A resolution was passed, empowering the Executive to at once take the matter of express rates on live poultry before the Board of Railway Commissioners and endeavour to determine what standardized shipping coop would be acceptable to the companies, and to have the rate lowered to remove the handicap under which the industry is labouring.

The officers for the ensuing year are: President, J. S. Greenshields; First Vice-President, Thomas Simpson; Second Vice-President, Richard Oke; Secretary-Treasurer, J. E. Rettie, Parliament Bldgs., Toronto, Ont.

APPOINTMENTS AND STAFF CHANGES

Mr. C. B. Gooderham, former assistant in the Bee Division of the Dominion Experimental Farms Branch, has been appointed Dominion Apiarist, as successor to Mr. F. W. L. Sladen, deceased.

Mr. J. Sydney Dash, a member of the staff of the Division in 1912-1913, and subsequently for several years Director of Agriculture, Guadeloupe, F.W.I., returned to Canada during the past summer in consideration of the health of his family. Mr. Dash has now

been appointed to a position in the Tobacco Division, and will devote his attention to the investigation of tobacco diseases.

Mr. Sidney Barnes has been appointed Field Husbandman at the Central Experimental Farm, Ottawa. Mr. Barnes, who served overseas during the war, is a graduate of the University of Alberta College of Agriculture, and has had considerable farm experience in Western Canada.

Mr. Stanislas J. Chagnon has been appointed as Assistant to the Dominion Animal Husbandman. Mr. Chagnon is a graduate of the Iowa State College of Agriculture.

Mr. Thomas F. Ritchie, formerly Assistant to the Superintendent of the Experimental Station, Lennoxville, Que., has been appointed Assistant in Vegetable Growing at the Central Experimental Farm.

Mr. W. W. Hubbard, Superintendent of the Experimental Station, Fredericton, N.B., has resigned his position.

Mr. I. L. Conners, who has been in charge of the Laboratory of Plant Pathology at Winnipeg, resigned his position as from January 19.

Mr. Joseph Burgess, who resigned his position in the Dairy Branch in October, 1920, to take a position with a commercial firm, has been re-appointed by the Civil Service Commission to a permanent position in the Branch as Chief Dairy Produce Grader, with general supervision of the cold storage work of the Branch.

Mr. W. E. Brown was appointed Cold Storage Inspector on August 15, 1921.

Mr. L. O. Tubman resigned his position as Inspector of Dairy Products in Western Ontario on September 2, and Mr. W. G. McKay has been appointed temporarily in his place.

Miss Helen G. Campbell has been transferred by the Civil Service Commission from the Soldiers' Settlement Board to the Dairy and Cold Storage Branch to fill the position

of Demonstrator and Lecturer in the uses of milk and its products and their relative value as articles of protective and general diet. After graduating from Macdonald Institute, Guelph, Miss Campbell took a post-graduate course at Columbia University, New York, specializing in Foods and Dietetics and Physiological Chemistry. Miss Campbell will be available as a speaker at meetings and to assist in child welfare and other movements of a similar nature.

Mr. L. L. Cooke, formerly Chief Stock Car Inspector, Health of Animals Branch, has been appointed to the Live Stock Branch as a District Live Stock Promoter with special reference to Live Stock Transportation in Eastern Canada.

C. E. Thomas, of Lloydminster, who has been engaged in dairy promotion and cow testing work for the federal government since 1914, and who is a successful practical dairy farmer, with one of the best producing dairy herds in the province, has been appointed by the Saskatchewan government to take charge of cow-testing work in that province.

Mr. F. G. Forster has been appointed Publicity Commissioner for the Alberta Department of Agriculture, succeeding Mr. James McCaig, deceased.

Mr. C. F. Patterson has been appointed to the professorship of Horticulture at the College of Agriculture, University of Saskatchewan. Professor Patterson is a native of Ontario and a graduate of the Ontario Agricultural College. He holds a Master's degree in Pomology and a Doctor's degree in Plant Physiology from the University of Illinois.

THE LIBRARY

LIST OF PRINCIPAL ACCESSIONS TO THE DEPARTMENTAL LIBRARY, INTERNATIONAL INSTITUTE BRANCH, DEPT. OF AGRICULTURE

Breeding Crop Plants, by H. K. Hayes and R. K. Garber. New York, McGraw-Hill Book Co. inc. 1921. 328 pp.

The Book of Poultry. Toronto, Macmillan Co. of Canada, 1921. 672 pp. illus. col. plates.

A Practical Handbook on the Distillation of Alcohol, by F. B. Wright. New York, Spohn & Chamberlain, 1918. 271 pp.

Practical Field Botany, by A. R. Horwood. London, Griffin, 1914. 193 pp.

Inheritance of Fecundity in Fowls, by Oscar Smart. London, 1921. 61 pp.

A Book about the Bee, by Herbert Mace. London, Hutchinson & Co., 1921. 138 pp.

The Challenge of Agriculture, ed. by M. H. Staples. Toronto, Morang, 1921. 197 pp.

The Milk Question, by M. J. Rosenau. New York. Houghton, 1912. 309 pp.

THE AGRICULTURAL GAZETTE OF CANADA

Lectures on Plant Physiology, by Dr. Ludwig Jost; authorized English translation by R. J. Harvey-Gibson, M.A., F.L.S., Oxford, Clarendon press, 1907. 564 pp. il. Supplement, 1913. 168 pp.

Economic History of Chosen. Seoul, Chosen, Bank of Chosen, 1921. 266 pp. illus.

Economic History of Manchuria. Seoul, Bank of Chosen, 1921. 303 pp.

Papers on Bacteriology and Allied Subjects, by former students of H. L. Russell. Madison, 1921. 199 pp. illus.

Co-operation in Ireland, by L. Smith-Gordon and C. O'Brien. Manchester, Co-operative Union, Ltd., 1921. 92 pp. (International co-operative series, No. 3).

Interior Decoration; its Principles and Practice, by F. A. Parsons. Garden City, N.Y. Doubleday, Page & Co., 1920. 284 pp. illus.

Linen from the Raw Material to the Finished Product, by Alfred S. Moore. London, Sir Isaac Pitman, n.d. 132 pp. illus.

The Fibre Plants of India, Africa and Our Colonies, by J. H. Dickson. London, William Macintosh, 1885. 380 pp.

The Chemistry of Crop Production, by T. B. Wood, C.B.E., etc. London, University Tutorial Press, 1920. 193 pp.

Pets and How to Care for Them, by L. S. Crandall. New York, Zoological Park, 1921. 303 pp. illus.

Reflections of a Moose Hunter, by J. S. Seabury. Boston, Thomas Todd, 1921. 68 pp. illus.

Markets of the World; a Series of Economic Maps and Statistical Abstracts of the Principal Countries of the World. Boston, First National Bank, 1920. 44 pp. maps.

Manuel du conducteur de machines agricoles, par A. Gougis. Paris, Librairie agricole de la maison rustique, 1920. 350 pp. il.

The Art of Soap-making, by Alexander Watt. London, C. Lockwood & Son, 1920. 310 pp. il.

Larousse agricole; encyclopedie illustree, publiee sous la direction du E. Chancrin et R. Dumont. Paris, Librairie Larousse, 1921. Vol. I. 852 pp. illus.

The Commercial Apple Industry of North America, by J. C. Folger and S. M. Thomson. Toronto, Macmillan Co. of Canada, 1921. 466 pp. il. (Rural science series).

Proceedings before the Royal Commission on the Importation of Store Cattle with Appendices, London, 1921. 605 pp. (Cd. 1541).

Trading with Asia, by Frank R. Eldridge, Jr., Chief, Far Eastern Division, U.S. Bureau of foreign and domestic commerce. New York, D. Appleton & Co., 1921. 474 pp. maps.

The Practice of Silviculture, by Ralph C. Hawley. New York, John Wiley & Sons, 1921. 352 pp. il.

Biochemistry, by Benjamin Moore, M.A., D.Sc., F.R.S. London, Edward Arnold, 1921. 340 pp.

Wild Life in Canada, by Captain Angus Buchanan. London, John Murray, 1920. 264 pp. illus.

Modern Manufacture of Chemical Manures. London, Sturtevant Engineering Co., Ltd., 1920. 85 pp. il.

Rural Arithmetic, by A. G. Ruston. London, University Tutorial Press, 1916. 431 pp.

Principles and Practice of Bookkeeping for the Farm, Garden, Dairy and Estate, by H. Taylor and J. O. Peet. London, Simpkin, Marshall, Hamilton, Kent & Co., Ltd., 1920. 285 pp.

Selection in Cladocera on the Basis of a Physiological Character, by Arthur U. Banta. Washington, 1921. 170 pp. (Carnegie Institution of Washington, Publication 305.)

Rural Denmark and Its Lessons, by H. R. Haggard. New York, Longmans, Green & Co., 1917. 335 pp.

Canada and the British Immigrant, by Emily P. Weaver. London, Religious tract society, 1914. 312 pp.

International Yearbook of Agricultural Legislation, 1920. Rome, International Institute, 1921. 862 pp.

The Rural Industries round Oxford, by K. S. Woods. Oxford, University Press, 1921. 180 pp.

Garden Work, by William Good. Glasgow Blackie & Son, Ltd. 381 pp. il.

The Distribution of Vegetation in the United States as related to Climatic Conditions, by B. S. Livingston and Forrest Shreve. Washington, 1921. 590 pp. (Carnegie Institution of Washington, Publication 284.)

THE AGRICULTURAL GAZETTE OF CANADA

A Garden of Herbs, by E. S. Rohde. London, Philip Lee Warner. 224 pp. plans.

Les mouvements des végétaux—du reveil et du sommeil des plantes, par René Dutrochet. Paris, Gauthier-Villars et cie., 1921. 121 pp. illus.

Fruit Growing in Arid Regions, by Wendell Paddock. Toronto, Macmillan, 1914. 395 pp.

Herbals; Their Origin and Evolution, by Agnes Arber. Cambridge University Press, 1912. 253 pp. illus.

Rothamstead Memoirs, Vols. 1-4, 6-9. Rothamstead, 1893-date. 8 vols.

Commerce International du Betail et de ses dérivés. Rome, Institut international d'agriculture, 1921. 140 pp.

Modern Milk Goats, by Irmagarde Richards. Philadelphia, J. B. Lippincott Co., 1921. 271 pp. illus.

The Roller, by T. A. Church. New York, author. 1921. 223 pp.

Problems of Life and Reproduction, by Marcus Hartog. London, John Murray, 1913. 362 pp. il.

The Geology of Soils and Substrata, by H. B. Woodward. London, E. Arnold, 1912. 366 pp. illus.

Bacteriology and Mycology of Foods, by F. W. Tanner. New York, John Wiley, 1919. 592 pp. illus.

Farming Costs, by C. S. Orwin. Oxford, Clarendon Press, 1921. 141 pp.

The Harvest of Japan, by C. Bogue Luffmann. Toronto, Nelson, 1920. 276 pp. illus.

Culinary Herbs; How to Grow and Where to Sell, by Mrs. M. Grieve. Whins medicinal Herb school and farm, Chalfont St. Peters Bucks. 98 pp. illus.

Poultry for Exhibition, by J. H. Robinson. Quincy, Poultry Journal Publishing Co., 1921. 176 pp. illus. \$2.00.

Chemistry of Agriculture for Students and Farmers, by C. W. Stoddart. Philadelphia, Lea & Febiger, 1921. 340 pp. il.

A to Z of Pigeons Fancy and Utility, by J. W. Williamson. Sellersville, Penn. Item Publishing Co., 1921. 88 p.

NEW PUBLICATIONS

DOMINION DEPARTMENT OF AGRICULTURE

Report of the Dominion Apiarist, 1921.—By F. W. L. Sladen; Dominion Experimental Farms.

Report of the Dominion Field Husbandman, 1921.—By E. S. Hopkins, B.S.A., M.S.; Dominion Experimental Farms.

Report of the Stations in Northern Ontario and Quebec, Kapuskasing, Ont., and La Ferme, Que., 1921.—Dominion Experimental Farms.

Division of Illustration Stations, 1921.—Report of the Supervisor, J. Fixter; Dominion Experimental Farms.

Experimental Farm, Nappan, N.S., 1921.—Report of the Superintendent, W. W. Baird, B.S.A.; Dominion Experimental Farms.

Experimental Station, Invermere, B.C. 1921.—Report of the Superintendent, R. G. Newton, B.S.A.; Dominion Experimental Farms.

Bulbs and Bulb Bloom.—By Lionel S. Stevenson, B.S.A., M.S., Superintendent, Experimental Station for Vancouver Island. Bulletin No. 48, Experimental Farms, Second Series.

Potato Crop Report, 1921.—Fruit Branch.

Commercial Feeding Stuffs.—Bulletin No. 47, Dominion Experimental Farms. This bulletin contains the chemical analyses and microscopical findings of samples collected throughout the Dominion.

Cold Storage Temperatures.—Circular No. 31, Dairy and Cold Storage Branch.

THE AGRICULTURAL GAZETTE OF CANADA

ONTARIO

Partial Neutralization of Acidity of Cream Before Pasteurization as a Factor of Butter-making.—By W. H. Sproule, B.S.A., Lecturer in Dairying, and M. Grimes, Fellow in Chemistry, Ontario Agricultural College.

BRITISH COLUMBIA

Dairy-Farm Survey.—Preliminary Report on Forty-Five Dairy Farms in the Chilliwack Courtenay, and Ladner Districts, 1920. By H. R. Hare, B.S.A., Extension Assistant, Department of Animal Husbandry, College of Agriculture, University of B.C. Circular No. 36.

Cost of Producing Apples in the Okanagan and Average Yields and Prices for Leading Varieties.—By W. A. Middleton, B.S.A.,

Extension Assistant, College of Agriculture, University of B.C. Circular No. 38.

Goat-Raising in B.C.—Bulletin No. 64 (Third edition), Live Stock Branch, Department of Agriculture.

MISCELLANEOUS

Dairy Factories, 1920.—Issued by the Dominion Bureau of Statistics. Prepared in collaboration with the Dairy and Cold Storage Branch of the Dominion Department of Agriculture, the Quebec Bureau of Statistics, and the Dairy Branches of the Provincial Departments of Agriculture.

Fruit Statistics of Canada, 1920.—Issued by the Dominion Bureau of Statistics.

PART V

The International Institute of Agriculture

FOREIGN AGRICULTURAL INTELLIGENCE

All communication in regard to this section should be addressed to T. K. Doherty,
International Institute Commissioner, Department of Agriculture,
West Block, Ottawa.

SCIENCE AND PRACTICE OF AGRICULTURE

CROPS AND CULTIVATION

Carbonic Acid Gas as a Fertilizer.—JESS, in *Journal d'Agriculture Pratique*, Vol. 35, No. 13, pp. 250-252. Paris, 1921.

In greenhouse and field investigations on the effect of applications of carbon dioxide to certain vegetable crops, the yield of greenhouse-grown tomatoes was increased from 29.5 kg. for an untreated house to 81.3 kg. for the treated. The yield of greenhouse cucumbers was increased from 138 to 235 kg.

Outdoor experiments with Irish potatoes resulted in increasing the weight of the average tuber from 140 to 330 gm. In an effort to determine the amount of carbon dioxide assimilated by the plants, two equal sized greenhouses, in one of which were growing 300 well-developed tomato plants and the other empty, were supplied with 1 per cent of the gas. A determination after a certain interval showed that the carbon dioxide content of the house with plants was markedly less than that of the empty house. The author believes that the gas escaping from organic manures has a marked influence on the growth of plants, and cites the results of an experiment with celery, carrots, and beans as evidence.

847.—Experiment made with "Clumine" upon Wheat, Barley and Oats in the Experiment Field of Grotto Rosso (Rome).—CUSUANO, E., in *L'Italia agricola*, Year 57, No. 6, pp. 178-180. Piacenza, June 15, 1920.

Prof. Lo Monaco, Director of the Institute of Physiological Chemistry of the Royal University of Rome, observed while studying certain asphyxiating gases, that they possessed the property of accelerating the germination of seed. He found, on growing various plants in nutritive solutions, that in the presence of these gases they germinated better, grew more vigorously, and gave a larger yield. He also obtained excellent results with Leguminosæ and Gramineæ cultivated in the open.

To this new fertilizer Prof. Lo Monaco has given the name of "Clumine", and the author has made comparative experiments for the purpose of testing the effects of "Clumine" and other fertilizers. In the above-mentioned article he gives the cultural data, the analyses of the soils before and after the experiments, the crops obtained from manured and unmanured soils, as well as soil analyses and data referring to the crops obtained in different parts of Italy in the course of other experiments with the same fertilizer.

In the experiments carried out by the author at Grotta Rota (Rome) "Clumine" induced more rapid germination and earlier ripening, (the manured plots being 3 days ahead of the unmanured), and a larger yield of grain (the increase being 760, 680, and 250 lbs. per acre in the cases of oats, barley and wheat respectively). Of the three applications of the fertilizer (45, 90 and 135 lbs. per acre), the intermediate amount has the greatest effect. "Clumine" does not exhaust the soil, except in so far as it leads to a larger crop. Experiments made in other parts of Italy confirm these results.

The author has the intention of continuing his investigations, but from what he has been so far able to see, he is of opinion that the action of "Clumine" is complex. In fact, it acts upon the seed by hastening its germination; it enables cultivated plants to get the better of weeds; it has an effect upon the organic and mineral substances present in the soil, rendering them more easily assimilated by the plants; and it is probable that it has a partial sterilizing action upon the soil.

946.—Soil Alkali.—HARRIS, F. S. *Circular No. 41, Utah Agricultural College Experiment Station*, pp. 1-8. Logan, Utah, January, 1920.

In general it may be said that soils containing more than 0.5 per cent soluble salts where

the larger part is composed of chlorides, carbonates or nitrates, and 1 per cent where sulphates predominate, are unsuitable for crop production without reclamation. These figures are of course modified by many conditions.

The crops to raise on alkali land depend on the degree of salinity of the soil, the uses that can be made of the crops, the markets, and other economic conditions as well as the climatic factors. Among the ordinary farm crops the smaller grains can usually be raised to about the best advantage. As a type of cropping for Utah alkali land, three crops were found suitable, used in rotation on damp medium alkali, namely:—sweet clover, sugar beets, and barley. Legumes as a class do not do well and maize and potatoes are also not usually successful.

To prevent alkali from becoming more serious, the author suggests: (1) The cutting off of seepage water from higher land; (2) reduction of evaporation from the surface land by cultivation and a consequent rise of salts from lower depths; (3) constant cropping; (4) the use of manure to reduce surface evaporation; (5) the proper use of irrigation water.

Native vegetation and a chemical analysis of the soil to a depth of at least 6 feet make an excellent combination in determining the degree of contamination of alkali land.

1070.—**The Crescograph, a new Apparatus for Studying the Growth of Plants.**—BOSE, J. C. (Calcutta University), in *La Nature*, No. 2423, pp. 161-165. Paris, September 11, 1920.

The study of plant growth is a subject of extreme practical importance, for the nourishment of the world depends closely upon the growth of plants. The movement of stalks, leaves, and roots, under the action of light, heat and pressure are often due to small variations in the rate of growth. The discovery of laws bearing on the movements of the organs of growth thus depends on the accurate measurement of the rate of normal growth, and variations from it. The amplifying crescograph is well illustrated in the article, and results of measurements are shown by numerous charts.

1073.—**On the Relations between Growth and the Environmental Conditions of Temperature and Bright Sunshine.**—BRENCHLEY, W. E., (Rothamsted Experimental Station in *The Annals of Applied Biology*, Vol. VI, No. 4, pp. 211-244. London, April, 1920.

1076.—**The Sterility of Hybrids from the Mendelian Stand-point.**—MALINOWSKY, E., in the *Zeitschrift für Induktive Abstammungs- und Vererbungslehre*, Vol. XXII, Part 4, pp. 225-235. Leipzig, May, 1920.

732.—**The "Ardito" Wheat, Obtained by Hybridization, in Italy.**—STRAMPELLI, N., in *L'Italia agricola*, Year 57, No. 6, p. 177, Piacenza, June 15, 1920.

This new variety of wheat was obtained by the author at the Cereal Experiment Station at Rieti. It was derived from the cross Tarwe x Rieti which gives an excellent yield but ripens exceedingly late, after hybridization with the Japanese wheat "Akagomughi" of no cultural value, but very early. It has the following characters:

Ears red, with an average density of 26, and a number of fertile spikelets varying between a minimum of 18 and a maximum of 22 (average 20).

Spikelets, bearing 4 to 5 fertile flowers; the average number of caryopses per ear is 65 to 70, with a maximum of 75 and a minimum of 50.

Glumes oval, with pronounced keel with a red tip, principal vein and secondary veins, with reddish brown edges.

Palea, oval, lanceolate, edge reddish brown, beards of varying lengths increasing in size from the bottom of the ear (3, 5, 10, 15 mm.) to the tip, (45 or 50 mm.)

Caryopses, fine reddish colour, varying in size and shape according to their position on the ear, but inclined to be oval and slightly inflated, lobes round in section, and concave ventrally. Average length 6.3 mm., average breadth to 3.3 mm., dorso-ventral diameter 2.8 to 3 mm.

Endosperm starchy, weight of 1,000 grains 35.40 gm. weight per bushels 63 lbs.

Stalks strong, barely 80 cm. in height.

Maturity very early; in 1917, harvested on June 17; in 1918, sown on the hillside, southern exposure, clay soil, harvested on June 8; in 1919, cultivated on the cool plains, it was ripe on June 30, whilst Rieti could not be harvested before July 15.

Yield.—The last crop gave more than 19 bushels per acre. This wheat must be sown somewhat thickly.

513.—**Improvement of Sugar Beet by Selection, in France.**—GAILLOT, M., in *Comptes rendus des Seances de l'Academie d'Agriculture de France*, Vol. V. No. 39, pp. 986-995. Paris, Dec., 1919.

The cultivation of sugar beet in the north of France is a subject of real interest: the rotation system is employed in conjunction with wheat production, and results in an entirely advantageous effect on meat value, as the stubble can be readily used for feeding purposes and for fattening live stock.

In addition to this, the sugar industry opens up in the same district commercial undertakings in all branches of national welfare, as, for example, agricultural machinery, industrial institutions, chemical fertilizers for which sugar beet is essential, chem-

ical products, textures and all materials necessary for the equipment of sugar factories.

In spite of this, the production of sugar beet in the north of France has a tendency to decrease and take a second place in relation to foreign competition.

Although to the outsider the richness of the sugar content in the roots, and the yield per hectare has always been on the increase, with the result in the natural course of events that the cultivation is increasingly profitable to the agriculturist, this is not the case in France. Quite apart from the questions of climate, soil, labour, etc., so often raised, the fundamental cause of this inferiority may be attributed to the fact that, with regard to the production of seed, the French market is entirely dependant on the foreign market. Consequently two serious difficulties are involved:

(1) the agriculturists cannot depend on any profit which is undoubtedly connected with the production and sale of beet-seed;

(2) the seed employed, even if guaranteed pure, comes inevitably from regions with a different climate and soil, and which, when taken to a new destination, may show some discrepancy, and this is often the case.

The author having insisted on the need of producing the necessary seed on native territory, following the German method, gives an account of the results of his own work of selection started in 1909.

For some years comparison cultivation trials were conducted with the French and foreign varieties considered to be the most adaptable to the various soils in the Soissonnais district. A comparison between the quality of the sugar and the weight of sugar produced per hectare on each type of soil, made it possible to discover the most suitable varieties. Amongst these, certain individual types were selected, distinguished by the development of characteristics which it was desired to stabilize, and they were reserved as parents for future generations and pure line selection.

To speak candidly, it is not a case of pure line selection in the true sense of the phrase. Apart from the ordinary course:—when the parents are isolated, and self-pollination is necessitated, a mixed progeny is the result with the following predominating features; red beets with white skin and leaves green and red, fodder beets, green and white beets, beets with lanceolate leaves and forked roots, similar to the wild beet, and a small number of individuals comparable with the parent. Also, as is well known, the sugar is obtained in successive stages from the fodder beet, and this in its turn is derived in a similar fashion from the wild beet. The isolation, in this particular case, has the habit of encouraging atavism by the dissociation of the characters in the beet.

By enclosing two instead of one specimen under the same cover, or even in the open air, the number of good roots attached to the progeny increases, even if there is always a higher percentage of natural material due to self-pollination. It is sufficient if the two types do not flower simultaneously, to ensure self-pollination.

To avoid mishap, the author believes it necessary to have recourse to crossing parent stock, by collecting them in small groups of 4 to 7 and engendering a simultaneous flowering period by constant pinching off of buds. In order to obtain good results, it is important that the individuals, as far as possible, possess the same characteristics. Their choice, however, will depend largely on a thorough investigation of the characters during the various phases in growth development up till the moment when the reproductive organs are developed.

The seeds thus obtained are taken from each plant and sown separately in plots, and the plants submitted to careful examination with respect to their botanic and physiological characters, such as:—late or early maturity, number of leaves, weight of root, sugar content and its quality, etc. The final choice is limited to types which transmit exactly similar characteristics to their progeny. These are reserved definitely as parent stock, and the seed sown the following year on plots devoted entirely to parent stock.

The beets collected from each plot undergo thorough examination in the field and in the laboratory. The chemical analysis is made in cold and warm aqueous solutions, and the beets have been subdivided as follows: (1) "super-elites"—to serve as new parent stock; (2) "elites" or grand parents, to serve as the source of seed for commercial purposes.

The super-elites have naturally been studied with the minutest attention and a special record kept, following the Galton curves method by which the percentage of beets showing equal proportion and equal quality in each family is signified. The plans, diagrams and illustrations, etc. make the comparison between the various progeny easy and effectual. As the beet is a perennial, it is hoped to maintain the production over super-elites as long as possible. It is certain that, in any case, the yield of seed decreases year by year, and it is the same with regard to the sugar content, which is 20-22% before transplanting and then falls to 4-6%. The author intends to keep a record of the value of the seeds thus collected for several years in succession, and compare these with the first year results.

The elites are also a subject of observation and rigorous selection during the growing period. All the elites proceeding from different families but belonging to the same order, are planted out close to each other, to enable

ready crossing. The seed thus obtained is reserved for use to grow plants intended later to furnish seed for commercial purposes.

967.—**Potato Production**.—STEWART, G., in *Utah Agricultural Experiment Station, Circular No. 40*, pp. 1-54. Logan, Utah, July, 1919.

The author gives details of distribution, description of the plants, place in cropping system, general cultivation, grading, storage, marketing and utilization. It is noted that too hot a climate is adverse to successful cultivation and it is therefore confined to the northernmost States of America. A cool moist climate is largely responsible for Europe's high acre yields combined with intensive farming, seed selection, and thorough rotation, and the careful use of fertilizers.

A diagram is given which shows the average acre yield and average farm price of potatoes in the United States 1866 to 1917. The annual production is 350 to 400 million bushels.

It is advised to leave at least five or six years between potato crops on the same land. After alfalfa, after maize planted on alfalfa stubble, after sugar beets, and after beans, are good places to plant potatoes according to the particular districts under inspection by the author. The application of farmyard manure should supplement rotation.

The fact that potatoes thrive best on sandy loam soils is adequately supported by the author's experiences.

1096.—**Cutting Potato Tubers for Planting Purposes**.—MOTTOT, S., in the *Journal d'Agriculture pratique*, Year 84, Vol. 23, No. 8, pp. 146-147. Paris, February 19, 1920.

The scarcity and high prices of potatoes during the last few years have brought into prominence the practice of cutting up of tubers for planting. The use of the peel and the eyes gives a saving in seed, but the result is not good, without taking into account the extreme care required and, consequently, the great cost of labour. As regards cuttings, this practice belongs more properly to gardening.

In cutting it is hardly ever possible to get an exact division of the eyes, as the tops are left the greatest number of best developed eyes; it would thus be more simple to cut off the tops and use them only. This method was described for the first time by M. Harraca during the war. He advised cutting the tops $\frac{1}{2}$ to $\frac{3}{4}$ of an inch thick, but the author believes it necessary to leave them about the size of a hen's egg.

The cutting of the tops of the tubers not only has the advantage of utilizing the best developed, youngest and most vigorous sprouts for growth, but ensures the tubers being healthy inside.

It is best to cut the tops some time before planting and place them in cool, well-lit, airy sheds. In this way a layer of dried cells forms over the cut portion, which prevents loss of moisture and enables the sprouts to develop more quickly.

1125.—**A Test of Commercial Fertilizers for Grapes**.—GLADWIN, F. E., in the *New York Agricultural Experiment Station Bulletin*, No. 458, pp. 27-43. Geneva, N.Y., Jan., 1919.

Grape fertilizer experiments were carried out at the above Station from 1909-1918, the commercial fertilizers in use being:—nitrate of soda—dried blood—cottonseed meal—acid phosphate—sulphate of potash, and lime. These were applied annually in varying proportions to different plants.

The tests show that nitrogen, phosphorus and potassium had a marked beneficial effect upon wood growth, yield and quality of fruit.

The first of these three elements was the most helpful both in wood growth and in the increase of fruit with larger berries and clusters. The foliage also after the first few years showed a better colour and size.

Phosphorus and potassium ranked second and the check plot a poor third in this last respect. The two former increased the production of wood and fruit but did not influence the quality of fruit to the same extent as nitrogen. Potassium caused earlier ripening of the foliage than the other elements and gave more pronounced results than phosphorus, but the latter had a more beneficial effect on green manure crops in the vineyard. It affected distinctly as compared with other materials, the growth of rye, barley, wheat and cow-horn turnips, and it is believed that through the promotion of better growth of green manures, it will contribute in a measurable degree to the production of fruit and wood.

Even though the same number of vine canes were tied up for fruiting purposes, the data show that the fertilizer plots produced a decided gain over the unfertilized.

1132.—**The Chemical Examination of Three Species of Larkspurs**.—BEATH, O. A., in *University of Wyoming Agricultural Experiment Station, Bulletin No. 120*, pp. 55-88, Laramie, Wyoming, June, 1919.

The subject matter is confined to general methods employed in larkspur investigations supplemented by such data as seemed advisable to give an intelligent understanding of the facts.

The three species under consideration were *Delphinium, glaucescens*, Rybd., *D. Barbeyi* Huth., and *D. Geyeri* Green, which clearly represent distinctive altitudes and habitats. The distribution and poisonous effects combined with characteristic symptoms with cattle affected are indicated. This is followed by preliminary tests for the determination of crude alkaloids by the volumetric method. Reference is made to the comparative toxicity of each poison, and in the case of *D. Geyeri* and *D. Barbeyi*, the amorphous product was in each case far the most poisonous. Chemically, the amorphous compounds were found to be quite stable substances. Oxidizing reagents such as hydrogen peroxide, nitric acid and potassium permanganate had more destructive effect than the chemicals usually employed in plant analysis.

Remedial measures.—The most advisable recourse according to the Bureau of Animal Industry, U.S.A. is the injection directly into the blood by means of an all-metal hypodermic syringe of the following remedy:—physostigmin salicylate 1 grain—pilocarpin hydrochlorid 2 grs.—strychnin sulphate $\frac{1}{2}$ gr. This formula would apply to an animal weighing 500 to 600 lb. The "Quitman" syringe has so far been found the most useful. The needle is most conveniently inserted in the shoulder.

There seems little doubt that prompt treatment of animals poisoned by larkspur would result in the saving of most of the cases.

A Cheap and Convenient Experimental Silo.—WESTOVER, H. L. and CARVER, S. in *Journal of the American Society of Agronomy*, Vol. 12, No. 2 pp. 69-72. Washington, D.C., 1920.

This contribution from the Bureau of Plant Industry, U. S. Department of Agriculture, consists of a brief review of early studies at the State experiment stations on experimental silos, followed by the report of preliminary experiments at the Department field station at Redfield, S. Dak., on the use of motor oil barrels as silage containers.

The materials, consisting of alfalfa, sweet clover, corn, sorghum, Sudan grass, Russian thistle, wild sunflowers, soy beans, corn and alfalfa 1:3, sorghum and alfalfa 1:1, and corn and alfalfa 1:1, were cut in a hand-feed cutter into $\frac{1}{2}$ in. lengths and packed tightly into the barrels by trampling and by heaping so that the cover had to be forced in. To further exclude the air the barrel heads were covered with a thick coat of paint. The contents of the barrels weighed from 150 to 200 lbs., depending upon the material and the tightness of packing.

After standing about three months the barrels were opened and the contents fed

to cattle unaccustomed to silage. All of the materials were eaten readily with the exception of the Russian thistle, which was refused absolutely, and of the wild sunflower, which was eaten very sparingly by one cow. It was thought that the wild sunflower had not been fermented properly, probably owing to the presence of resinous substances. The authors conclude that the method may be used advantageously in testing the value of different plants for silage.

The Quality of Silage Produced in Barrels.—NEWTON, R., in *Journal of the American Society of Agronomy*, Vol. 13, No. 1, pp. 1-11, Washington, D.C., 1921.

A more elaborate study than the one noted above of the suitability of barrels as containers for experimental silage is reported. The silage materials used were Northwestern Dent corn in the early milk stage of maturity, Mammoth Russian sunflowers with seeds just beginning to develop, corn and sunflowers 1:1, Banner oats in the dough stage, and Silverhull buckwheat with well-developed seeds. All of these crops were frozen September 1, and were cut September 3 and 5. The barrels were filled in the field with the materials cut in $\frac{1}{2}$ -in. lengths and firmly packed, each barrel holding about 250 lbs. of the material. The barrels were closed with loose-fitting covers and stored in the basement of the experimental barn until early in the following June. When the barrels were opened for examination, the blackened portion from the top and additional material showing decay were removed and the remainder divided into two portions representing second and first quality silage. Samples of both were analyzed for moisture content, total nonvolatile, and volatile acidity, and total and amino nitrogen. The analyses reported as compared with samples taken from an ordinary farm silo and published results of silage analyses indicated that the barrel silage was normal in all important respects.

Palatability tests were conducted by feeding to a dairy herd of 10 cows from 8 to 10 lbs. each of the experimental silage in addition to the regular evening feeding of from 15 to 20 lbs. of pea-and-oat silage. The order of increasing palatability, as judged by these tests, was sunflower which was not entirely eaten, buckwheat which was left to be eaten last, corn and sunflower, peas and oats, and oats alone, the last being eaten with avidity before the regular feed.

899.—Bee-Keeping in Isolated Hives.—ROBERT -AUBERT, in *L'Apiculture*, Year 64, No. 7, p. 155. Paris, July, 1920.

Bee-keepers, whose stock is attacked by foul-brood, are usually those who take

their honey too early and use composite hives arranged in such a way that they always obtain relatively large quantities. Taking the honey and replacing the frames of these hives for the bees to clean are two operations that encourage the queen to lay at the very time when she ought to be prevented from so doing. If the honey supply continues, no harm is done, but if the honey-season is finished, which is generally the case in districts where foul-brood is rife, there is a great risk that the bees seeing their emptying frames, will let part of the brood die on account of want of honey.

The author has substituted for this pernicious system one which 25 years' experience has proved most satisfactory. He uses Layens hives with 20, 22 and 25 frames. In May, he pays his first visit, cleans the hives, divides any food that is left, and replaces useless frames with sections containing beeswax. Having done this, he does not open the hives again until after September 1, unless the season is a good one, in which case, he visits them again, to take the honey from the side opposite the brood. This operation takes place once every three years. In September, he removes the superfluous honey, and as the bees only concern themselves with the part of the hive where they are going to winter, this hardly disturbs them at all, and the replacing of the frames to dry only gives them one day's work.

The result of 25 years' beekeeping with isolated hives according to this simple method is that the honey supply has never failed and the author has taken the honey every year. The average yield in Oise during these 25 years was from 48 to 55 pounds per hive per annum. His great triumph is that even in bad seasons, it has never been necessary to feed the bees. The latter were thus allowed to live naturally, they received no food, the brood did not die, and there were no signs of foul-brood.

M. Robert-Aubert is of opinion that if all bee keepers followed his example, many more hives could be kept and much larger quantities of honey obtained without losing the brood. Bee keepers who take too much honey, whose broods die, and who are obliged to feed their bees on a large scale every year, are evidently in the wrong.

FARM ENGINEERING

First International Trial of Mechanical Flax Pullers.—*The Implement and Machinery Review*, London, Sept. 1, 1921.

The first international trial of mechanical flax pullers, organized by the French Flax Committee and the Society of Agriculturists, with subventions from the Office Regional et Departmental Agricole et du Comite

Linier, took place in the presence of more than 2,000 people at Wattignies-Lille, on July 5. Among the visitors were Messrs. Nuudin, Prefet du Nord, Loulis Nicole, president de la Ste. Industrielle du Nord de la France et du Comite Linier de France des Agricultures du Nord, Georges Potre, Senateur, Buche, Tribonnaux, and Labounoux, directeurs des services Agricoles des Departements du Nord, du Pas-de-Calais et de la Seine, Inferieure, and H. Depoilly, secretaire du Comite Linier de France. Flax spinners present were Messrs. Jean Le Blan, Leon Descamps, R. Descamps, Bommart, Duriez, Clause Guillemand, G. Merceille, etc.; flax buyers and strippers included:—Messrs. Maquet, Feuillet, Peuffaillit, J. Durand, Collette, Trystam, M. and L. Chavatte, Delattre, Boulet, Van Eslande, Cahes, Leroy, and Vandenriche, while there were also large numbers of influential agriculturists in attendance.

The trials having been organized so late in the season, two machines only were able to participate, says the official report, a copy of which we have translated. The first machine to take part in the trials was the Pusch Tombyll, modified by the engineer, M. Schneider. This puller has a series of toothed pulling members mounted on a sheaf binder, which makes bundles of the size of a good handful, ties them by hemp, and discharges them on one side. The pulling apparatus consists of rubbered rollers which are placed at an angle of 45 deg. to the ground. Rakes working in a circle urge the flax on to these rollers, and it is then pulled by other rollers working in pairs. After having passed by the rubbered rollers, the flax is taken hold of by wooden rollers of a special formation, and falls on to a moving platform, which conducts it to the binder. Experiments with this machine were first made in November of 1920 on flax sown the previous July for the Flax Exhibition. Owing to the cold, the soil being frozen, it was impossible to pull the flax by hand, and it was thought advisable to postpone the trials to a later date. This course, however, was not adopted, and, to the surprise of everyone present, the machine pulled the flax with as great ease as though the conditions had been normal, only the weeds of less than 20 centimetres being left in the ground, and but a small proportion of the badly frozen straw being broken during the pulling. This machine, it is added, can pull two hectares, about 5 acres, per day.

The report then gives a description of the flax puller made by Messrs. Marshall, Sons & Co., Ltd., Gainsborough, and which was described and illustrated in *The Review* for March. The capacity with horses is given by the report at three to four hectares per day, about eight to ten acres.

The trials began at 9 a.m. and continued until 4 p.m., and it is said that the results would have been very satisfactory if the machines had each had a trial run before the competition. Thus the French machine arrived in a brand new state, and many parts were so coated with paint as to necessitate much time being spent in its removal before the machine could be got to work. Further, the land was so dry as a result of the drought that the wheel for imparting motion to the mechanism could not get a proper grip, and the slipping which followed prevented this machine from doing the work as it might have done. However, the pulling was done in an entirely satisfactory manner.

With regard to the Marshall machine, it is said that the combs intended to pull the flax were too short by five millimetres, evidently being intended for large flax, and this fault caused 20 per cent of the thinner stalks to remain in the ground. The judges decided that they should not consider the event as a trial, but rather as an experiment. As a consequence prizes were not awarded, but a bounty of 5,000 francs was given to each of the two manufacturers to encourage them in their efforts.

We are informed by Messrs. Marshall that their machine worked perfectly during the trials. The state of the crop was abnormal in every respect; the flax was in an over-ripe condition, and should have been pulled at least three weeks earlier. The ground was "baked as hard as concrete" by the drought, and the conditions were bad even for hand-pulling, therefore rendering it more difficult to pull by mechanical means. "Our machine", they say, "gave an excellent exhibition, and we were quite satisfied with its performance. It was freely admitted on all sides that the principle was ideal, and, in fact, we heard no adverse criticism. We may say that the machine was sold on the conclusion of the trials, a proof of its satisfactory performance." Messrs. Marshall add that it will be necessary to make a few minor alterations to the combs to suit French flax, and next year they will be able to offer with confidence a perfect pulling machine, suitable in every way for the French growers.

Since the French trials Messrs. Marshall have also taken part in a mechanical flax-pulling demonstration held in Ulster under the auspices of the Department of Agriculture and Technical Instruction for Ireland. This demonstration took place in a field of flax sown also with clover and grass, the latter being very tall. Owing to the non-arrival of the correct size of the sprocket-wheel on the day of the demonstration, some difficulty was experienced with the tall grass; but the correct sprocket-wheel having arrived on the following day, the machine, it is said, "gave a most perfect

demonstration" under exactly the same conditions as those of the previous day, and the owner of the field expressed his entire satisfaction with the machine which he had purchased.

RURAL ECONOMICS

Cost of Producing Wheat.—COOPER, M. R. and WASHBURN, R. S., in *U. S. Department of Agriculture, Bulletin* 943. p. 59, Washington, D. C., 1921.

Tabulated cost data derived from 481 records, of which 197 were obtained in five representative counties of the principal spring-wheat States, North and South Dakota and Minnesota, and 284 in nine counties in Kansas, Missouri and Nebraska, important winter-wheat States, furnish the basis of this analysis of the average cost and variation in cost on individual farms and groups of farms in each area visited, as well as of the more important reasons for the great variations in cost per acre and per bushel on individual farms. A total area of 43,940 acres seeded to winter wheat, yielding 635,124 bushels, and a total area of 44,218 acres seeded to spring wheat, with the total production of 362,047 bushels for the crop year 1919, were involved.

The average yield of spring wheat was 9 bushels per acre in the United States as a whole in 1919, and 8.4 bushels per acre for the total spring-wheat area surveyed; the average yield for all winter wheat in 1919 was 14.7 bushels per acre, while that for farms surveyed was 14.9 bushels per acre. The largest number of spring-wheat farms fell within the group having a yield of from 5 to 10 bushels per acre, while the largest number in the winter-wheat districts were included in the group having a yield of from 15 to 20 bushels.

The difference between the gross cost and the sum of credits for pasture and any straw utilized on the farm is taken to be the net cost of producing wheat. The average cost expense of each item was computed on a weighted basis by dividing the total cost of each item by the total wheat acreage. An analysis of the total cost for spring and winter wheat shows that labour constitutes about 32 to 35 per cent. of the total cost of production, thrashing about 8 per cent, materials from 10 to 17 per cent, land rent from 24 to 30 per cent, and other costs from 17 to 19 per cent.

The average cost of producing winter wheat was \$27.80 per acre and \$1.87 per bushel as compared with an average cost for spring wheat of \$22.40 per acre and \$2.65 per bushel. The difference in cost per bushel of producing spring and winter wheat is due to a lack of relation between the cost of producing an acre of wheat and yield

obtained, the cost per acre of winter wheat being 24 per cent greater than for spring wheat, whereas the yield per acre was 77 per cent greater than for spring wheat. In the spring-wheat area about 33 per cent of the production was on the farms having costs above the average; in the winter-wheat area about 40 per cent of the production was on farms having costs above the average.

Summaries of costs by districts, range in cost per acre by counties, net cost per bushel, variations in items of cost, area of farms according to cost per bushel by counties, cumulative percentage of acreage grown at various bushel cost, cumulative percentage of total production, and individual costs per acre are tabulated and interpreted.

AGRICULTURAL INDUSTRIES

1181.—**The Potting of Honey.**—*L'Indépendant de Seine-et-Oise*, quoted in *L'Apiculteur*, Year LXIV, No. 9, pp. 220-221. Paris, Sept., 1920.

Freshly extracted honey is transparent and liquid, then it becomes opalescent, opaque, very hard, *i.e.* granulated.

Before potting, the impurities should be allowed to rise and then skimmed off. Bad tasting and fermented honey are treated thus: Boil for 2 minutes in a copper vessel 6.6 lbs. of honey, $1\frac{1}{4}$ lb. of water, $\frac{3}{8}$ lb. of chalk; then add $\frac{1}{8}$ lb. of washed and dried powdered carbon and boil for another 2 minutes. Add 3 whites of egg beaten in $\frac{1}{8}$ lbs. of water and boil for another 2 minutes. Leave to cool and then filter. The honey may also be melted over a water-bath and a red hot iron plunged into it; then pot as a preserve.

Scum on the honey indicates that it is obtained from sainfoin and is of good quality. If liquid honey is preferred, it can be liquefied in the following way:—Heat over a water-bath until nearly completely melted without boiling or stirring, and allow to cool slowly; or pasteurize the honey at 194°F. for 15 minutes, but for a longer time at 122° to 131°F. is preferable; or heat over a water-bath at 171 to 181°F., and draw off into pots while hot. Granulated honey becomes very hard and can be made into briquettes squares and cubes which should be wrapped in waxed paper.

Freezing Injury to Potatoes when Undercooled.—R. C. WRIGHT and G. F. TAYLOR
U. S. Dept. Agr. Bull. 916 (1921), pp. 15.—

In this investigation of the injury to potatoes due to exposure to temperatures below the freezing point, it was found that potatoes freeze more quickly when exposed to rapidly diminishing temperatures than when the temperatures diminish slowly.

Potatoes can be undercooled several degrees below their true freezing point, then warmed again above the freezing point without freezing injury, provided no ice formation takes place. When undercooled, jarring resulting from rough handling or incidental to hauling is liable to cause potatoes to freeze. After freezing commences it is progressive, and the amount of injury caused within a stated time is said to depend upon the surrounding temperature. In under-cooled potatoes, when freezing has once begun, the temperature of the potatoes is said to rise to its true freezing point and remains at that temperature for a varying length of time, depending upon the surrounding temperature.

PLANT DISEASES

1046.—**Correlation between Size of the Fruit and Resistance of Tomato Skin to Puncture: Relation to Infection with *Macrosporium* Tomato.**—ROSENBAUM, J. and SANDO, C. E., in *The American Journal of Botany*, Vol. VII, No. 2, pp. 78-82, Brooklyn, Feb., 1920.

The fact that artificial infection with *Macrosporium* tomato Cooke from tomato on uninjured tomato fruit can be obtained, provided fruit of a certain maturity as measured by size is used, has previously been established. The question now under consideration is to ascertain the cause of this apparent immunity or resistance in the fruit after it reaches a certain maturity. Previous investigations show that it is apparent that there is good evidence that some parasitic plants make their way into their host plants by breaking through the tissues mechanically and that the main factor in this penetration is the growth pressure of the fungus filament. Experiments by Hawkins and Harvey with *Pythium* on potatoes supports this evidence. The results obtained by Blackman and Welsford, with *Botrytis cinerea* on *Vicia Faba* show that the piercing of the cuticle is due solely to the mechanical pressure exerted by the germ tube as a whole or by the special outgrowth from it.

The methods employed by the authors were as follows. The tomatoes were grown in a commercial way in the fields of southern Florida. At first fruits of various sizes were selected at random. Inoculations were made from tagged blossoms at the end of each week.

The *Macrosporium* cultures were isolated from tomato fruit. Spores were obtained according to the Kunkel method.

The resistance of the skin of the fruit to puncture was determined by use of the Joly balance as modified by Hawkins and Harvey. Generally ten punctures were made on each fruit where tomatoes of different sizes were used. The average of these

readings gives fairly accurately the pressure necessary to puncture a particular fruit. The authors give tables showing the relation between resistance of skin to puncture and *Macrosporium* infection on different sized tomatoes, at 23°C. and showing the relation between these on tomatoes of different age.

The evidence obtained shows that: (1) while a chemical difference is found in the analysis of young and old fruits, this is not the limiting factor in infection with *Macrosporium*. The fungus grows just as readily on the pulp and extracts of old fruits as on those obtained from young tomatoes. Moreover, positive infection has been obtained on fruits of all degrees of maturity when the skin is injured or removed previous to infection; (2) surface sections of old and young fruits failed to reveal the presence of stomata or other natural openings in the skin; (3) in the development of a tomato fruit, the cuticular layer increases in thickness with the age of the fruit. Measurements to determine the resistance of the skin have shown that there is a definite and direct correlation between age and the resistance of the skin to puncture. Infection experiments have shown that the amount of infection which it is possible to obtain decreases with the age of the fruit.

While the results do not prove absolutely that the inhibition of infection is a purely mechanical one, the resistance of the tomato skin to puncture may explain, at least partially, the ease with which infection without previous injury is obtained on the young fruit but not on the older fruit.

Temperature and Humidity Studies of Some Fusaria Rots of the Irish Potato.—

Goss, R. W., in *Journal of Agricultural Research*, Vol. xxii, No. 2, pp. 65-80. Washington, D.C., October, 8, 1921.

Fusarium oxysporum, *F. trichothecioides*, and *F. radicola* are all capable of producing a rot of the potato tuber. In pure culture the amount of growth of all these species is nearly equal at 77°F., *Fusarium oxysporum* and *F. radicola* increasing in growth up to 86°, where they produce their maximum growth. The growth of *F. trichothecioides* decreases above 77°, until at 86° very little or no growth takes place. It is more tolerant of the lower temperature than the other two species.

Preliminary tests with different liquid media would indicate that the cardinal points for growth of these Fusaria vary to some extent with the medium used. Experimental infection of tubers was produced with all three organisms under various conditions of temperature and relative humidity. Preliminary tests with *Fusarium oxysporum* indicated that the relative hum-

idity plays a very important part in determining the amount of rotting.

In comparative tests with new and old tubers there is a distinct difference in the amount of rotting under the same conditions. The rotting was much more rapid and progressed much further in the old than in the new tubers. Comparative tests with all three species at controlled relative humidities from 1 to 100 per cent and at controlled temperatures from 41° to 77° F. proved conclusively that—

A temperature of 77° F. is favourable for the production of a tuber rot by *Fusarium oxysporum*, *F. radicola*, and *F. trichothecioides*.

Fusarium oxysporum grows more rapidly and produces a more extensive rotting of tuber than the other two at a temperature of 61°F. and above.

Fusarium trichothecioides is capable of procuring a rot at much lower temperatures than the others, in some cases causing rotting at 41°F.

The relative humidity plays a very important role in determining the progress of tuber rots and has the same influence on all three species. In every experiment it was noticeable that there was a gradual increase in the amount of rot corresponding to an increase in relative humidity. With a high humidity at a given temperature the rotting was always greater than at a temperature 41°F. to 50°F. higher but with a low humidity. The Fusaria used can all live and sporulate at the low temperature of 9°, and with low relative humidities, but they are not capable of producing a rot under these conditions.

Inasmuch as the three species of Fusaria used in these experiments represent the common types causing storage-rots of potatoes, it is clear that considerable attention should be given to moisture as well as temperatures where incipient rot occurs in stored tubers. It is also entirely probable that a rotting of the tubers initiated at high temperatures and high relative humidities could be completely checked by submitting the tubers to lower temperatures and lower humidities.

1192.—*Macrosporium Solani* Hyphomycete Injurious to Tomato in Delaware.—

ROSENBAUM, T., in *Phytopathology*, Vol. X, No. 9, pp. 415-422. Baltimore, Md., September, 1920.

Numerous specimens of tomato plants were received in June and July, 1919, from Delaware, showing a disease, the symptoms of which differed markedly from those of any known disease of tomatoes.

The stems, at the point where they emerge from the ground first turn dark brown. This brown rot or canker penetrates deeply into the tissues and extends above and

below the surface soil. With age, the infected portion of the stem becomes even darker in colour, the tissues shrivel and may break, and the stem falls over at the original point of infection. Occasionally similar brown to black spots are found on other parts of the stem above ground. In such cases, it often spreads a considerable distance from the point of infection and in many cases the rot at the base of the plants produces a girdling effect. If this occurs when the tomato plants are still young, they throw out new roots above this point. In addition to these effects, the plants show varying degrees of wilting and discolouration of the leaves. The disease has been found on tomato plants of all ages, both in the seed bed and in the field. The symptoms mentioned suggested the possible designation of this disease as "foot rot".

This disease was found doing considerable damage in Delaware.

A microscopic examination of diseased stems showed fungus mycelium within the affected tissues.

Numerous isolations from infected plants and from artificial inoculations in the field and greenhouse, establish the fact that a fungus belonging to the genus *Macrosporium* is the organism responsible for the disease in question.

Comparisons of this *Macrosporium* were made with *M. Solani* from potatoes; with *Macrosporium* cultures isolated from a tomato fruit rot from New Jersey, and with typical "nail-head" spots on tomatoes in Florida. These comparisons show that the *Macrosporium* here discussed differs from the one isolated in Florida, and resembles, on the other hand, *M. Solani* and the *Macrosporium* isolated in New Jersey. It should then be referred to in future as *Macrosporium Solani* Ell and Mart.

914.—Self-Sown Wheat in Relation to the Spread of Rust, in Australia.—WATERHOUSE, W. L., in *The Agricultural Gazette of New South Wales*, Vol. XXXI, Pt. pp. 3, pp. 165-166. Sydney, May 2, 1920.

Report of periodical observations made from June, 1918, to March, 1919, in the Government Experiment Farms in New South Wales with a view to securing evidence on the question as to how rust of wheat survives after the heat of the Australian summer, and how the next year's crop comes to be infected.

The summer of 1918-1919 was one of the hottest on record in the districts under investigation; drought conditions were general and no rust epidemic was reported anywhere in the State.

It should be remembered the destructive rust of the wheat crop in Australia is the black stem rust (*Puccinia graminis*). A

second form, known as the brown spring rust (*P. triticea*) occurs, but it does not usually do much damage.

In June, 1918, on the leaves, stems and ears of the self-sown wheat, and in abundance on the fields reserved for this crop, a large amount of *P. graminis* in the uredo and the teleuto stage was found, as well as uredospores of *P. triticea*. These uredospores were tested and proved viable. No sign of *P. graminis* was found on the cultivated crop; although pustules of *P. triticea* were plentiful on the seedling leaves.

At the end of August, 1918, the self-sown wheat was badly attacked by rust, but on the leaves of the cultivated crops, only uredospore pustules of *P. triticea* were found. One paddock that had previously contained a self-sown wheat crop that had been attacked, and later on had been ploughed, produced many wheat plants growing up between the furrows attacked by both forms of rust; *P. graminis* and *P. triticea*.

Towards the end of November, on the green parts of cultivated wheat, viable uredospores of both rusts were found, though practically no damage had been done to the crop. "Volunteer" wheat, particularly around haystacks, was red with *P. graminis* on all parts of the plants above ground. The field under consideration had been ploughed, reploughed and cultivated, but in spite of this, a few stray "volunteer" wheat plants carrying viable uredospores of both rusts were still to be found.

The latest inspection was made at the end of March, 1919. The summer had been exceptionally dry and very hot; no second growth had occurred, the stubble having been killed out by the dry weather in most places. A light rain in February had encouraged germination of much of the shed grain, but on these seedlings no rust was discovered. Only in one place was rusted wheat found, this was in a paddock which had laid fallow for nearly a year, ploughed a couple of months previously, and at the time of this visit was being cross-ploughed and harrowed in preparation for sowing the wheat. Here, in the centre of several much-grazed tufts of wheat that had assumed a somewhat perennial nature, were found uredo pustules on leaves, inner surface of sheaths and stems. In the cases examined the rust proved to be the brown spring rust, but it is by no means improbable that the black summer rust was also present in some of the tufts. In an adjoining paddock, no rust pustules were found in the early sown crop of wheat. Numerous pale patches were observed on many of the seedling leaves.

While these observations are far from complete, they nevertheless show the importance of self-sown wheat as an agency in the spread of rust by means of the uredospores.

THE AGRICULTURAL GAZETTE OF CANADA

INJURIOUS INSECTS

1051.—*Empoasca Mali* and *Empoa Rosae*, Two Leaf-Hoppers Injurious to Apple Nursery Stock in the United States.—ACKERMAN, A. J., in *United States Department of Agriculture*, Bulletin 805, pp. 1-35, Bibliography of 28 publications. Washington, D.C., December 15, 1919.

The Apple Leafhopper (*Empoasca mali*), both in the nymph and adult stage, causes serious injury to apple nursery stock by extracting the plant juices from the terminal leaves of the host. As a consequence the leaves curl, become undersized, and fail to function normally, thereby retarding the growth of the trees. In southern Pennsylvania this species is three-brooded and hibernates only in the adult stage. Eggs are laid within the leaf tissue on the underside of the leaves. This leafhopper is widely distributed over the United States, and attacks a variety of plants.

In literature, the above species has been confused with another leaf hopper, which also attacks the foliage of nursery apple trees, namely, the rose leafhopper, *E. rosae*. The latter insect is two-brooded, and winter is passed in the egg stage. Winter eggs are deposited under the bark of apples trees; these hatch out about a month earlier in the spring than eggs deposited by wintered females of *E. mali*.

E. rosae may be distinguished from *E. mali* by its lighter colour and by the absence of the six or eight white spots present on the frontal margin of the pronotum of the latter species. Distinction between the nymphs of the two species is more difficult. The distinct types of injury produced by the two insects, however, is a ready means of distinguishing them. *E. rosae* feeds on the lower leaves and produces white or yellow spots on them, while *E. mali* attacks the terminal leaves, curls them, and stunts the growth of the trees.

Parasites seem to play a far more important role in reducing the numbers of the rose leafhopper than those of *E. mali*. Larvae of dryid parasites are quite common on the adults of the former, while they have only rarely been found attacking the latter. Two parasites of the winter egg of *E. rosae* have been observed, namely, *Anagrus epos* Girault and *A. armatus* Ashm. var. *nigri-ventris* Girault, and these help considerably in checking the number of this species. No parasites have been reared from the eggs of *E. mali*.

A single spraying with 40% nicotine sulphate at the rate of 1 to 1,500 combined with soap will so materially check an infestation by *E. mali*, when applied against the first-brood nymphs, that injury caused later by those that escape, will be of little consequence. The same treatment made two

or three weeks earlier is effective against *E. mali*, although this species is seldom sufficiently injurious to justify a special application.

1199.—The Selection of Food Plants by Insects with Special Reference to Lepidopterous Larvæ.—BRUES, C. T., in *The American Naturalist*, Vol. LIV, No. 633, pp. 313-332. Lancaster, Pa., July-Aug., 1920.

Nearly all the larvæ of the Lepidoptera are phytophagous at the present time and according to the author there can be no question that since the order has existed, this condition has prevailed. Owing to the change in the form of the trophi during metamorphosis by which the adults develop haustellate or sucking mouthparts, the food of the adults is entirely different from that of the larvæ, and they subsist on liquids, mainly the nectar of flowers.

Although nearly all the species feed on plant food, a few isolated cases feed on other living insects or on material of animal origin; wool, horn, beeswax, etc. The prey in the second case almost always consists of Coccids or Aphids where predatory caterpillars are concerned. Other interesting examples are the *Feniseca tarquinii* which feed on plant lice on the alder and the *Lycaena arion*. The larva is herbivorous in its early stages, but enters the nest of ants to prey upon the anti-larvæ during its final period of growth. No less than 75 species of European Lepidopterous caterpillars are known to be occasionally predatory through temporary aberrations of their trophic instincts. Such plasticity of behaviour leads to the conclusion that the origin of sarcophagy in Lepidoptera is due to independent changes which have become firmly fixed in individual species or genera.

The use of Phanerogams as food plants is very general, but it is noticeable that in a former tabulation (Scudder) of the food plants of butterflies of eastern N. America, the following families are entirely omitted:—Iridaceæ, Orchidaceæ, Caryophyllaceæ, Euphorbiaceæ, Vitaceæ, Primulaceæ, and Rubiaceæ. Observations as to the habits of special species seems, however, to indicate that the selection of food plants must be considered as dependent upon one or several of a number of factors namely:

(1) The odour of the plant and also its taste; for example, the oligophanous species occurring on Cruciferae, Umbelliferae and various Compositae, and the selection by the same insect of several plants in a family like the Solanaceae where a more or less similar odour does not become a family characteristic.

(2) Some attribute of the plant.

(3) A similarity in the immediate environment or general form of the food plant. Certain oligophanous and polygaphanous caterpillars feeding mainly on trees or shrubs, e.g., as the gipsy moth, *Cercropia* moth, etc., and some of the Arctiid moths that feed upon a great variety of low plants.

(4) Apparently chance associations that have become fixed, which seem to be analogous to structural mutations.

The food habits are tabulated as follows:

Melitæids.....	Various plants.
Lumenitids.....	"
Apaturids.....	"
Ruralids.....	"
Urbicolids.....	"
Papilionids.....	" (several groups with particular food plants).
Vanessids.....	Urticacæ, Compositæ, etc.
Argynnis.....	Violacæ exclusively.
Brenthids.....	Violacæ generally.
Pierids.....	Cruciferae essentially.
Anthocaris.....	"
Satyrids.....	Graminae mainly
Sub Group Thymelicines.....	"
Urbicolines.....	"
Cyclopidines.....	"
Hesperines.....	Leguminosæ and various other plants almost entirely.
Coliads.....	"
Gonepterygids.....	Rhamnacæ.
Lycaenids.....	Diverse food habits.
Chrysophanids.....	Polygonacæ almost exclusively.

Experiments with Grasshopper Baits.—

PARKER, J. R., and SEAMANS, H. L., in *Journal of Economic Entomology*, Vol. 14, No. 1, pp. 138-141. Concord, N. H., 1921.

This is a brief report of preliminary experiments conducted in Montana during the summer of 1919 for the purpose of improving the efficiency and reducing the cost of the poison bran mash commonly used for grasshoppers, special attention being given to finding substitutes for lemons and oranges. A brief reference is made by Cooley in a report previously noted.

Amyl acetate was found to be not only the most attractive of the materials tested but also the cheapest of those that ranked high in attractiveness, an ounce, costing 5 cents, being equal to 8 lemons or oranges. Vanilla ranked second in the list of attractive materials and with amyl acetate was far better than any of the other materials tried, although its present cost prevents its use. Of the fresh fruits, watermelon gave the best results, but it was not nearly as attractive as amyl acetate or vanilla and but little better than salt alone. Salt alone was found to give as good results as molasses

and salt, and both gave better results than when lemons or oranges were added. Oranges ranked fifth in the list of 12 attractive elements used, and lemons ranked tenth in order.

It is pointed out that these tests were conducted with adults of only one species, namely, *Camnula pellucida* Scudd., which had gathered in great numbers for breeding and egg laying.

935.—**Infestation of the White Pine Aphid, *Lachnus Strobi* on *Pinus Strobus* in Massachusetts, U.S.A.**—PIERSON, H. B., in *Psyche*, Vol. XXVII, Nos. 2-3, pp. 62-63, Boston, Mass., April-June, 1920.

Whilst in the Harvard Forest, Petersham (Massachusetts), the attention of the author was called to a somewhat isolated clump of white pine trees (*Pinus Strobus*), 40 to 50 years old, which were dying.

On two sides of the clump, which consisted of a dozen trees were young white pine plantations.

A careful examination showed that the trees were being killed as the result of an extremely heavy infestation of black aphids which upon identification proved to be *Lachnus strobi* Fitch., the White Pine Aphid. Many of the larger limbs were barren of foliage, whereas on others the foliage was brown, the individual needles each showing many puncture marks made by the aphid when feeding.

The tree was first examined on October 10, 1919, at which time the aphids were laying their eggs on the green needles, in a series of straight lines, generally consisting of 5 or 6 eggs per line, but it was not at all uncommon also to find 10 or 15 attached end to end.

As many as 27 eggs were found on a single needle. At this particular period, large numbers of the aphids were still feeding, and these had congregated on the needles and small twigs. The survival of the insects in spite of heavy rains and low temperatures was remarkable; subsequent investigations showed them feeding up till about November 1.

819.—**Effect of Deleterious Gases on Insects.**—*Bulletin de la Societe entomologique de France*, No. 5, p. 82, Paris, 1920.

Ch. Demaison reports that, in the neighbourhood of Rheims, there was an apparent scarcity of insects during the year 1919. He imagines that the continuous distribution of gas in this district evidently has some effect and he calls attention to the interest of this question from the point of view of applied entomology.

THE INTERNATIONAL REVIEW OF AGRICULTURAL ECONOMICS

The following is a brief indication of the contents of the more important articles in the May, 1921 and June-July, 1921 numbers of the Institute Economic Bulletin. Persons interested in any of the articles may obtain the original Bulletin on application to the Institute Branch, Department of Agriculture, so long as the supply for distribution is not exhausted.

MAY

The Agricultural Co-operative Movement in Germany in 1918-19—27 pages. The article deals with the general development of agricultural co-operation in Germany during the period in question, the federations of agricultural co-operative societies, agricultural credit societies, agricultural co-operative societies for purchase and sale, co-operative dairy societies, and miscellaneous co-operative societies.

Agricultural Co-operation in Norway from 1914 to 1919—9 pages.

Insurance of Farm Crops Against Hail in the United States—17 pages. The subjects covered by the article are: The development of mutual hail insurance companies; Causes of failure of mutual hail insurance companies; Joint-stock fire insurance companies doing a hail insurance business; The state hail insurance department; Territorial distribution; The cost of hail insurance; The hail insurance contract; Special problems in hail insurance.

Recent Legislation Relating to Agricultural Credit in Italy—14 pages. The author first deals with the new features in recent legislation and the provisions for land and agricultural credit in favour of associations of agricultural labourers. He then takes up the question with regard to the different provinces of Italy.

Earnings and Working Hours of Farm-Workers in Scotland—21 pages.

The Regulation of the Working Hours of Agricultural Labourers in Holland—7 pages.

Shorter articles in the May number are: The Bulgarian agricultural union; The eight hour day in agriculture in Czecho-Slovakia; Land settlement in California.

JUNE-JULY

The Co-operative Movement in Czecho-Slovakia—20 pages. Discusses the place of co-operation in the national economy, the characteristics of agricultural co-operation

in Czecho-Slovakia, the development of agricultural co-operation in the republic, etc.

Agricultural Co-operation in South Africa in 1920—7 pages. Deals with the financing of co-operative societies by the land bank, maize selling societies, statistics of co-operative societies, legislation, and state aid to co-operation.

Climatology and Insurance against Hail—2 pages. M. Jean Mascart, Director of the Observatory at Lyons, has recently shown in a communication to the *Academie d'Agriculture de France*, that mutual insurance against hail is rendered possible by the study of climatology; and further, that no sound solution can be found otherwise than by the application of the science of meteorology.

M. Mascart takes a hypothetical case of a strictly mutual insurance society each member paying in proportion to the frequency of the risks and to the assured value. Mutuality here consists in each member setting aside each year for his premium a sum corresponding to the amount of risk; the society fixes the amount of this sum, this insurance premium which it receives and administers; its function is to enable the individual to bear repeated losses. The solution of this problem is possible whenever the necessary data from which to fix the correct premium are available.

Although very interesting from a theoretical point of view, the mutual insurance system expounded by M. Mascart presents two difficulties, well recognized by the author himself.

(1) This method of insurance is only applicable where the indispensable scientific basis exists, and where it is possible to group together solely regions having the same characteristics, or effect reinsurance in common with such regions.

(2) Also it assumes that all the land to which it applies is insured, in other words that insurance is compulsory, and it does not seem likely that insurance against hail will be made compulsory in France in the near future.

The National Mortgage Bank of Argentina and the Latest Regulations Concerning it—8 pages. The article describes the bank's transactions, the various kinds of loans made by it, the insurance the bank requires the mortgagor to take out, the sale of property on which the bank has foreclosed, and the financial position of the bank on December 31, 1919.

Agricultural Colonies in Italy for the Orphans of Peasants Killed in the War.—10 pages.

Land Settlement in Paraguay.—17 pages. Discusses agricultural economic conditions in Paraguay, first agricultural colonies, immigration laws, the colonization law,

special rules for the settlement of the natives in colonies, etc.

Some of the shorter articles in the June-July number are: Compulsory insurance against accidents in agriculture in Italy in 1920; Rules to be followed in the formation of mutual agricultural insurance societies; The work of the national grain office of Holland.

AGRICULTURAL STATISTICS

THE CROPS OF 1921

In the following tables are published the official estimates of the acreage and production in 1921 of wheat, rye, barley, oats, corn and potatoes in all the countries from which figures have been obtained by the International Institute of Agriculture. Corresponding data for 1920 and for the average of the five years 1915-19 are given for comparison. With regard to the five-year average the figures for some countries are not available, consequently totals are not given.

On an increased area of 3,300,000 acres the total production of wheat in 31 countries is over 200,000,000 bushels greater than that of last year. The bulk of the increase is in Europe, France and Italy showing especially large gains. India is the only country to show a large decrease.

There is also a large increase in the production of rye, 210,000,000 bushels in 20 countries. Again the largest increases are in Europe, especially in Germany and Poland.

Barley shows a total increase of 32,000,000 in 26 countries. There is a decrease of 39,000,000 bushels in the United States and an increase of 41,000,000 in Algeria.

The total production of oats has decreased from last year in 24 countries nearly 450,000,000 bushels. The great decrease is in the United States—practically the same as the total decrease.

Corn shows a decrease of 100,000,000 bushels, on account of the reduction of practically that quantity in the United States crop.

There is a total reduction of 260,000,000 bushels in the potato crop of 18 countries.

WHEAT

Countries	Area			Production		
	1921	1920	Average 1915-19	1921	1920	Average 1915-19
	Acres	Acres	Acres	Bushels	Bushels	Bushels
Germany.....	3,562,000	3,413,000	3,292,000	97,865,000	82,859,000	82,784,000
Austria.....	378,000	371,000	407,000	6,452,000	5,424,000	5,843,000
Belgium.....	353,000	306,000	287,000	11,523,000	10,275,000	6,980,000
Bulgaria.....	2,361,000	2,151,000	2,327,000	42,510,000	39,705,000	31,474,000
Denmark.....	220,000	180,000	143,000	7,000,000	6,945,000	6,115,000
Spain.....	10,350,000	10,255,000	10,227,000	143,205,000	138,606,000	139,853,000
Finland.....	20,000	19,000	18,000	280,000	272,000	251,000
France.....	12,910,000	12,097,000	11,744,000	315,639,000	230,406,000	194,089,000
Alsace-Lorraine.....	304,000	288,000	226,000	7,132,000	5,907,000	3,763,000
Great Britain and Ireland.....	2,084,000	1,979,000	2,330,000	74,000,000	56,898,000	72,096,000
Greece.....	988,000	1,399,000	1,069,000	11,170,000	12,194,000	11,679,000
Hungary.....	2,697,000	2,662,000	.....	47,087,000	38,295,000	.....
Italy.....	11,780,000	11,290,000	11,224,000	192,838,000	141,338,000	168,028,000
Luxembourg.....	27,000	27,000	25,000	661,000	449,000	462,000
Norway.....	41,000	41,000	26,000	941,000	999,000	638,000
Netherlands.....	177,000	152,000	147,000	8,686,000	5,765,000	5,244,000
Poland.....	2,982,000	1,791,000	.....	34,796,000	18,258,000	.....
Roumania.....	5,904,000	5,007,000	.....	97,218,000	70,343,000	.....
Sweden.....	360,000	360,000	338,000	12,563,000	10,528,000	8,805,000
Switzerland.....	117,000	119,000	126,000	3,799,000	3,586,000	4,254,000
Czecho-Slovakia.....	1,538,000	1,566,000	.....	40,674,000	26,362,000	.....
Canada.....	23,261,000	18,232,000	16,343,000	329,835,000	263,189,000	254,480,000
United States.....	56,744,000	57,192,000	57,872,000	740,655,000	787,128,000	830,895,000
India.....	25,722,000	29,949,000	31,142,000	250,468,000	377,886,000	347,908,000
Japan.....	1,300,000	1,300,000	1,332,000	27,874,000	28,288,000	29,608,000
Algeria.....	2,816,000	2,648,000	3,179,000	41,480,000	8,561,000	32,077,000
Egypt.....	1,458,000	1,190,000	1,353,000	37,011,000	31,711,000	33,560,000
Morocco.....	1,469,000	1,997,000	1,551,000	17,466,000	21,999,000	18,202,000
Tunis.....	1,500,000	1,343,000	1,459,000	8,818,000	5,225,000	8,003,000
South Africa.....	839,000	823,000	860,000	8,449,000	8,113,000	6,668,000
Australia.....	9,405,000	9,083,000	9,636,000	146,614,000	146,795,000	113,550,000
Argentina.....	13,838,000	15,015,000	16,464,000	207,000,000	184,930,000	170,870,000
Totals.....	197,505,000	194,225,000	.....	2,971,709,000	2,769,239,000	.....

THE AGRICULTURAL GAZETTE OF CANADA

RYE

Countries	Area			Production		
	1921	1920	Average	1921	1920	Average
	Acres	Acres	Acres	Bushels	Bushels	Bushels
Germany.....	10,617,000	10,688,000	11,300,000	260,147,000	195,731,000	251,500,000
Austria.....	758,000	711,000	829,000	12,661,000	10,046,000	11,258,000
Belgium.....	523,000	523,000	400,000	17,761,000	18,169,000	7,315,000
Bulgaria.....	489,000	452,000	467,000	8,390,000	9,798,000	5,856,000
Spain.....	1,738,000	1,799,000	1,819,000	27,768,000	27,830,000	26,567,000
Finland.....	605,000	603,000	589,000	10,385,000	9,173,000	9,835,000
France.....	2,050,000	2,001,000	1,989,000	41,919,000	33,174,000	29,764,000
Alsace-Lorraine.....	108,000	108,000	88,000	2,575,000	2,258,000	1,530,000
Greece.....	222,000	131,000	70,000	3,151,000	1,360,000	943,000
Hungary.....	1,370,000	1,475,000	.....	22,094,000	20,564,000	.....
Italy.....	287,000	282,000	280,000	5,634,000	4,539,000	4,794,000
Luxemburg.....	20,000	20,000	20,000	1,488,000	340,000	403,000
Norway.....	36,000	36,000	46,000	1,115,000	970,000	985,000
Netherlands.....	492,000	492,000	495,000	16,646,000	14,245,000	13,408,000
Poland.....	8,838,000	7,236,000	.....	167,217,000	74,842,000	.....
Roumania.....	777,000	771,000	.....	10,539,000	11,168,000	.....
Sweden.....	914,000	914,000	911,000	28,514,000	23,055,000	20,251,000
Switzerland.....	57,000	50,000	56,000	1,800,000	1,622,000	1,646,000
Czecho-Slovakia.....	2,183,000	2,224,000	.....	54,382,000	32,942,000	.....
Canada.....	1,842,000	650,000	358,000	25,800,000	11,306,000	5,586,000
United States.....	4,544,000	5,043,000	4,789,000	64,332,000	69,318,000	69,159,000
Totals.....	38,470,000	36,209,000	.....	783,318,000	572,450,000	.....

BARLEY

Countries	Area			Production		
	1921	1920	Average	1921	1920	Average
	Acres	Acres	Acres	Bushels	Bushels	Bushels
Germany.....	2,814,000	2,962,000	2,889,000	82,348,000	82,660,000	80,834,000
Austria.....	267,000	238,000	268,000	5,201,000	4,392,000	4,344,000
Belgium.....	91,000	90,000	78,000	3,939,000	4,350,000	3,449,000
Bulgaria.....	551,000	545,000	564,000	13,241,000	13,926,000	10,266,000
Spain.....	4,261,000	4,319,000	4,029,000	94,487,000	90,463,000	83,978,000
Finland.....	297,000	293,000	285,000	4,939,000	4,983,000	4,747,000
France.....	1,532,000	1,449,000	1,514,000	34,472,000	35,400,000	31,552,000
Alsace-Lorraine.....	117,000	118,000	98,000	3,334,000	3,299,000	2,550,000
Greece.....	.....	581,000	404,000	6,430,000	7,026,000	6,163,000
Hungary.....	1,187,000	1,266,000	.....	20,590,000	22,586,000	.....
Italy.....	541,000	494,000	526,000	10,362,000	5,870,000	9,319,000
Luxemburg.....	5,000	5,000	6,000	96,000	104,000	120,000
Norway.....	156,000	156,000	125,000	4,310,000	5,382,000	4,266,000
Netherlands.....	62,000	56,000	58,000	3,651,000	2,743,000	2,588,000
Poland.....	2,430,000	1,944,000	.....	53,306,000	39,309,000	.....
Roumania.....	3,280,000	3,385,000	.....	64,952,000	63,203,000	.....
Sweden.....	402,000	402,000	427,000	11,809,000	11,012,000	12,658,000
Switzerland.....	16,000	18,000	19,000	552,000	620,000	637,000
Czecho-Slovakia.....	1,583,000	1,711,000	.....	47,365,000	37,238,000	.....
Canada.....	2,796,000	2,552,000	2,343,000	64,253,000	63,311,000	57,104,000
United States.....	7,713,000	8,083,000	8,155,000	163,399,000	202,024,000	208,098,000
Japan.....	.....	2,987,000	2,986,000	89,898,000	92,140,000	95,543,000
Algeria.....	2,508,000	2,444,000	2,870,000	50,491,000	9,425,000	38,163,000
Egypt.....	374,000	340,000	418,000	11,371,000	10,449,000	12,093,000
Morocco.....	1,905,000	2,341,000	2,034,000	29,510,000	39,645,000	30,993,000
Tunis.....	1,230,000	934,000	1,209,000	11,482,000	2,622,000	8,377,000
South Africa.....	87,000	91,000	93,000	1,217,000	1,137,000	1,314,000
Totals.....	36,205,000 ¹	39,804,000 ¹	.....	887,005,000	855,319,000	.....

¹ Less Greece and Japan.

THE AGRICULTURAL GAZETTE OF CANADA

OATS

Countries	Area			Production		
	1921	1920	Average 1915-19	1921	1920	Average 1915-19
	Acres	Acres	Acres	Bushels	Bushels	Bushels
Austria.....	664,000	627,000	709,000	17,671,000	15,035,000	14,223,000
Germany.....	7,883,000	8,015,000	7,453,000	305,774,000	315,789,000	287,734,000
Belgium.....	603,000	586,000	561,000	28,472,000	31,873,000	17,476,000
Bulgaria.....	407,000	332,000	342,000	10,609,000	9,529,000	6,236,000
Spain.....	1,527,000	1,588,000	1,460,000	37,680,000	35,551,000	31,165,000
Finland.....	1,038,000	1,013,000	980,000	26,380,000	23,116,000	23,734,000
France.....	8,044,000	8,166,000	7,385,000	223,468,000	273,815,000	202,963,000
Alsace-Lorraine.....	252,000	252,000	210,000	7,318,000	8,202,000	5,921,000
Greece.....	273,000	273,000	187,000	3,891,000	3,761,000	3,744,000
Hungary.....	807,000	802,000	.....	18,953,000	20,995,000	.....
Italy.....	1,199,000	1,159,000	1,152,000	35,553,000	22,799,000	32,274,000
Luxembourg.....	62,000	62,000	61,000	1,459,000	1,740,000	1,840,000
Norway.....	342,000	342,000	329,000	11,992,000	14,191,000	14,391,000
Netherlands.....	378,000	395,000	373,000	20,036,000	20,881,000	20,244,000
Poland.....	4,738,000	4,119,000	.....	140,979,000	104,922,000	.....
Roumania.....	2,167,000	2,165,000	.....	65,292,000	51,146,000	.....
Sweden.....	1,757,000	1,758,000	1,878,000	63,636,000	66,447,000	68,838,000
Switzerland.....	53,000	56,000	74,000	2,857,000	2,931,000	4,121,000
Czecho-Slovakia.....	2,003,000	1,972,000	.....	68,097,000	56,145,000	.....
Canada.....	16,949,000	15,850,000	13,116,000	510,093,000	530,710,000	419,775,000
United States.....	44,829,000	43,323,000	42,452,000	1,078,519,000	1,526,055,000	1,432,697,000
Japan.....	.....	282,000	165,000	11,373,000	10,506,000	6,546,000
Algeria.....	558,000	574,000	575,000	10,741,000	4,669,000	14,639,000
Tunis.....	165,000	149,000	153,000	4,863,000	1,394,000	3,437,000
South Africa.....	530,000	564,000	519,000	6,741,000	7,331,000	8,052,000
Totals.....	96,955,000 ¹	94,424,000	.....	2,712,447,000	3,159,553,000	.....

¹ Less Greece and Japan.

CORN

Countries	Area			Production		
	1921	1920	Average 1915-19	1921	1920	Average 1915-19
	Acres	Acres	Acres	Bushels	Bushels	Bushels
Austria.....	112,000	102,000	117,000	2,456,000	2,122,000	2,739,000
Bulgaria.....	1,418,000	1,399,000	1,431,000	34,386,000	34,428,000	22,401,000
Spain.....	1,181,000	1,168,000	1,166,000	28,048,000	27,692,000	27,361,000
Alsace-Lorraine.....	8,000	8,000	7,000	104,000	177,000	138,000
Greece.....	494,000	599,000	435,000	7,874,000	9,133,000	6,710,000
Hungary.....	2,017,000	2,017,000	.....	27,140,000	50,156,000	.....
Italy.....	3,707,000	3,710,000	3,785,000	94,484,000	89,299,000	89,716,000
Switzerland.....	5,000	6,000	5,000	218,000	279,000	246,000
Czecho-Slovakia.....	363,000	369,000	.....	10,501,000	9,648,000	.....
Canada.....	297,000	292,000	235,000	14,220,000	14,335,000	11,912,000
United States.....	108,901,000	104,601,000	106,552,000	3,151,698,000	3,232,367,000	2,797,625,000
Algeria.....	24,000	22,000	22,000	358,000	254,000	316,000
Morocco.....	375,000	309,000	564,000	3,726,000	3,436,000	4,612,000
Tunis.....	50,000	23,000	45,000	315,000	19,000	265,000
Totals.....	118,952,000	114,545,000	.....	3,375,528,000	3,473,345,000	.....

THE AGRICULTURAL GAZETTE OF CANADA

POTATOES

Countries	Area			Production		
	1921	1920	Average 1915-19	1921	1920	Average 1915-19
	Acres	Acres	Acres	Bushels	Bushels	Bushels
Germany.....	6,627,000	6,079,000	5,555,000	985,243,000	1,037,964,000	849,205,000
Austria.....	313,000	290,000	319,000	26,207,000	24,600,000	30,017,000
Belgium.....	419,000	366,000	388,000	93,366,000	82,913,000	103,931,000
Bulgaria.....	19,000	15,000	13,000	1,650,000	932,000	601,000
Spain.....	789,000	841,000	770,000	102,225,000	107,834,000	104,018,000
Finland.....	198,000	208,000	202,000	18,245,000	17,865,000	17,870,000
Alsace-Lorraine.....	216,000	209,000	152,000	19,259,000	37,678,000	22,417,000
Hungary.....	683,000	628,000	.....	45,591,000	75,968,000	.....
Italy.....	741,000	744,000	738,000	55,115,000	52,261,000	52,391,000
Luxemburg.....	33,000	33,000	31,000	2,756,000	5,284,000	5,356,000
Norway.....	130,000	130,000	128,000	27,305,000	31,076,000	30,869,000
Netherlands.....	430,000	427,000	435,000	84,767,000	102,272,000	102,896,000
Sweden.....	363,000	367,000	388,000	62,391,000	61,639,000	69,189,000
Switzerland.....	113,000	125,000	136,000	25,373,000	28,256,000	29,983,000
Czecho-Slovakia.....	1,517,000	1,499,000	.....	136,430,000	183,812,000	.....
Canada.....	702,000	785,000	634,000	110,895,000	133,831,000	86,693,000
United States.....	3,972,000	3,929,000	3,986,000	356,076,000	428,368,000	371,283,000
Algeria.....	46,000	43,000	37,000	1,029,000	985,000	1,806,000
Tunis.....	3,000	3,000	2,000	147,000	235,000	133,000
Totals.....	17,314,000	16,719,000	.....	2,154,070,000	2,413,773,000	.....

THE CROPS OF THE SOUTHERN HEMISPHERE

Present interest largely centres in the crops being harvested in Argentina and Australia. There are reports of crop deterioration in southern Argentina from drought, but it is acknowledged that wheat in the other parts of the country is good. Harvesting is making favourable progress. Preliminary reports indicate a large crop, but it must be remembered that the area to be harvested is 1,000,000 acres less than that of last year, and that preliminary estimates of the Argentine crops are usually revised downwards.

On September 26th the Argentine Ministry of Agriculture reported that there was an exportable surplus of 47,000,000 bushels of old wheat on hand at that date. Exports,

however, have been very small since then, and opinions have been expressed that this estimate was much too high.

The quality of the new wheat in Australia is reported to be good. The first official estimate of the wheat crop is 146,000,000 bushels, the same as last year. Later reports indicate a reduction, and Broomhall places the yield as low as 104,000,000 bushels.

With regard to the plans for handling the new wheat crop in Australia nothing has been fixed. Broomhall states that there is an open market in South Australia, a compulsory government pool in Western Australia, a voluntary pool in Victoria, and nothing yet settled for New South Wales.

FOREIGN CROP CONDITIONS

(December 24, 1921)

United Kingdom.—On the whole weather conditions were favourable in November. In the first part of December the weather was fine and autumn sowing was well forward. The condition of the young wheat plants was satisfactory. A slight reduction was expected in the wheat acreage.

France.—A long period of dry weather hindered sowing, and agricultural conditions generally were unfavourable. Conditions improved early in December and sowing was resumed. A reduction in the cereal acreage was expected.

Spain.—Weather conditions were variable, and seeding was hindered by rains. It was reported that acreage sown to cereals would be short.

Italy.—Weather conditions were not favourable in the last part of November but improved in December. The latest reports were to the effect that farm work was well forward.

Germany.—The condition of the new crops is satisfactory. Sowing was carried out under normal conditions.

THE AGRICULTURAL GAZETTE OF CANADA

Roumania.—Weather conditions were not favourable and the acreage sown to wheat in this country as well as in the other Balkan States was expected to be very short.

North Africa.—Conditions were generally favourable. Heavy rains had put the soil in excellent condition. Some increase in acreage was expected.

India.—The favourable crop outlook in this country was being maintained.

Manchuria.—Prospects of wheat exports from this country are poor. Large quantities are being sent to the famine areas of Russia via Siberia. It has been reported that the Chinese government will place an embargo on the export of all grain from Manchuria.

THE WORLD'S WHEAT SITUATION

(Russell's Commercial News, Dec. 7)

European markets have been showing a better tone and some advance in price with business developing in moderate amount from day to day. The fact that world's exports have kept up to an average of 12,400,000 bushels per week for twenty-two weeks and, in the same time, the European visible as reported by Broomhall, has decreased 31,000,000 bushels indicates a world's disappearance for the twenty-two weeks since

July 1st of 300,000,000 bushels of wheat or 13,600,000 bushels per week against 275,000,000 bushels last year or 12,500,000 per week. If the scale this year is kept up for the balance of the year it would make a world's demand far in excess of the general estimates. This condition has occurred during the time when western Europe, it was claimed, had been buying most conservatively owing to their own large and fine crops.

LIVE STOCK STATISTICS

SPAIN

Classification	Number		Increase (+) or decrease (—)	
	1920	1919	in number	per cent
Horses.....	594,351	576,889	+ 17,462	+ 3.0
Mules.....	1,069,408	1,049,471	+ 19,937	+ 1.9
Asses.....	1,014,026	916,328	+ 97,698	+10.7
Cattle.....	3,396,573	3,173,577	+ 222,996	+ 7.0
Sheep.....	19,337,427	17,734,922	+1,602,505	+ 9.0
Goats.....	3,970,656	3,685,808	+ 284,848	+ 7.7
Swine.....	4,228,964	4,106,791	+ 122,173	+ 3.0
Camels.....	5,083	5,400	— 317	— 5.9

NEW ZEALAND

Classification	Number		Increase (+) or decrease (—)	
	January 31, 1921	January 31, 1920	in number	per cent
Horses.....	333,743	346,407	— 12,664	— 3.7
Cattle.....	3,112,742	3,101,945	+ 10,797	+ 0.3
Sheep.....	23,236,328	23,919,970	—683,642	— 2.9
Swine.....	342,227	266,829	+75,398	+28.3

THE AGRICULTURAL GAZETTE OF CANADA

SCOTLAND

Classification	Number		Increase (+) or decrease (-)	
	June 4, 1921	June 4, 1920	in number	per cent
Horses.....	216,190	214,337	+ 1,853	+ 0.9
Cattle.....	1,141,402	1,165,712	- 24,310	- 2.1
Sheep.....	6,646,336	6,360,928	+285,408	+ 4.5
Swine.....	144,859	128,559	+ 16,300	+12.7

IRELAND

Classification	Number		Increase (+) or decrease (-)	
	June 1, 1921	June 1, 1920	in number	per cent
Horses.....	554,851	562,474	- 7,623	- 1.4
Mules.....	27,006	27,111	- 105	- 0.4
Asses.....	230,017	226,553	+ 3,464	+ 1.5
Cattle.....	5,197,120	5,022,860	+174,260	+ 3.5
Sheep.....	3,708,290	3,585,598	+122,692	+ 3.4
Goats.....	261,217	244,914	+ 16,303	+ 6.7
Swine.....	977,169	982,418	- 5,249	- 0.5

AN INVESTMENT that Increases in Value the longer it is Held.

AN INVESTMENT you can Realize upon immediately, without loss.

AN INVESTMENT that will yield $5\frac{1}{2}\%$ Interest, compounded half-yearly.

AN INVESTMENT that is backed by All the Resources of Canada.

is offered you in

Dominion of Canada Savings Certificates

Denominations to suit every Investor

<u>\$5</u>	<u>\$10</u>	<u>\$25</u>	<u>\$50</u>	<u>\$100</u>
-------------------	--------------------	--------------------	--------------------	---------------------

Obtainable at the following Prices:

\$4.25 \$8.50 \$21.25 \$42.50 \$85.00

at any Bank or Money Order Post Office

"INVEST TO-DAY!" "SAVE BEFORE YOU SPEND !!"

Issued by The Finance Department, Ottawa

DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
PUBLICATIONS BRANCH

Vol. 9: No. 2

March-April, 1922

The AGRICULTURAL GAZETTE
OF CANADA

J. B. SPENCER, Director of Publicity

Wm. B. VARLEY, Editor

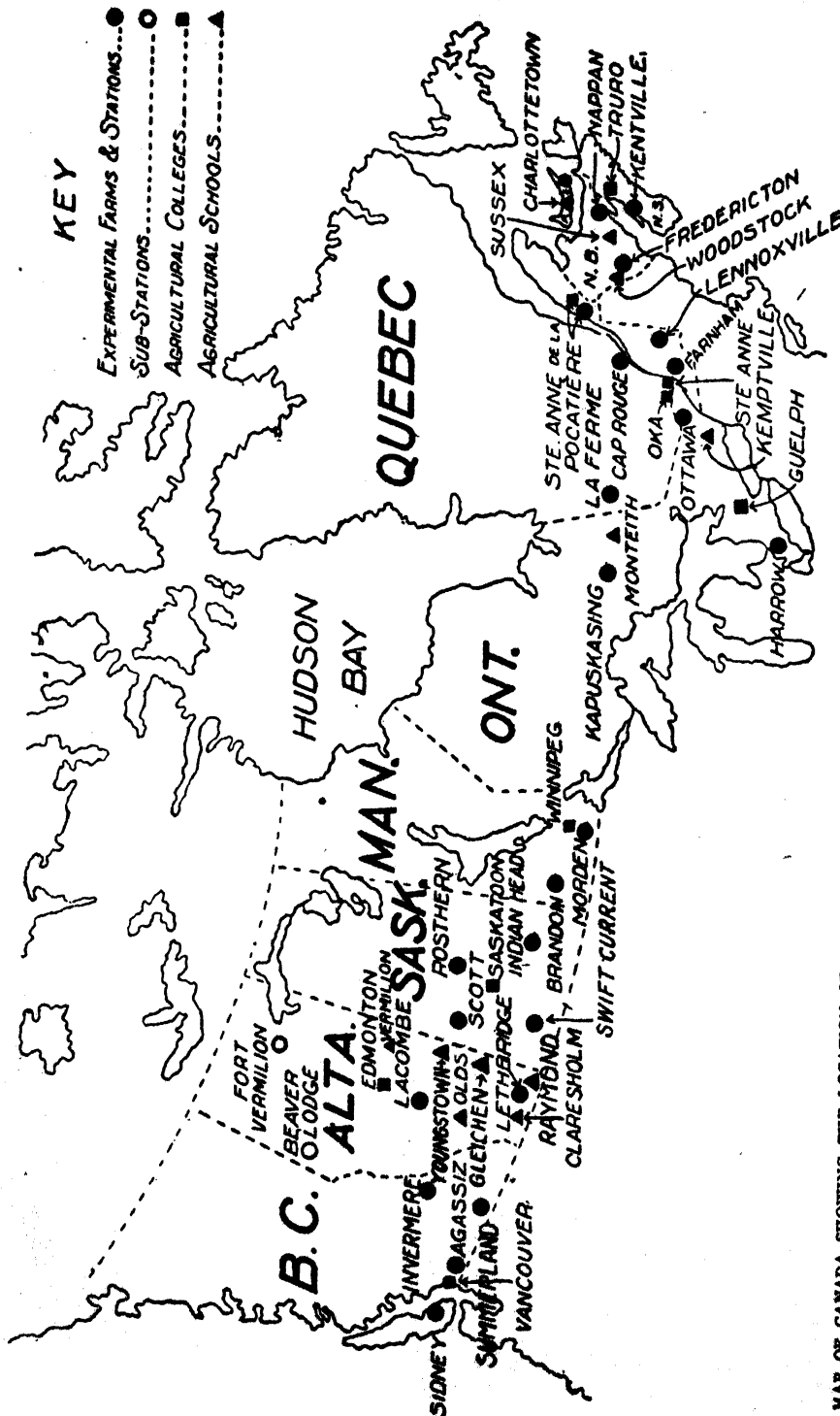
Issued by authority of the Honourable W. R. Motherwell, Minister of Agriculture
OTTAWA

OTTAWA

F. A. ACLAND

PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1922

SWEDE CREEK



MAP OF CANADA SHOWING THE LOCATION OF FARMS, STATIONS AND SUB-STATIONS IN THE EXPERIMENTAL FARMS SYSTEM, THE AGRICULTURAL COLLEGES AND AGRICULTURAL SCHOOLS

CONTENTS

PART I.

DOMINION DEPARTMENT OF AGRICULTURE

	PAGE
CORN: ITS HISTORY, PRODUCTION AND UTILIZATION—THE EUROPEAN CORN BORER, by J. H. Grisdale, D.A.Sc., Deputy Minister of Agriculture for Canada.....	83
THE DOMINION EXPERIMENTAL FARMS—THE PRINCE EDWARD ISLAND EXPERIMENTAL STATION, by J. A. Clark, B.S.A., Superintendent.....	87
THE REINDEER INDUSTRY, by E. A. Watson, Capt. C.A.V.C., Chief Animal Pathologist, Health of Animals Branch.....	93
NEW VARIETIES OF APPLES ORIGINATED AT THE CENTRAL EXPERIMENTAL FARM, by W. T. Macoun, Dominion Horticulturist.....	96
THE DOMINION EDUCATIONAL BUTTER SCORING CONTEST, 1921—FINAL RESULTS, by Geo. H. Barr, Chief, Dairy Division.....	99

PART II.

PROVINCIAL DEPARTMENT OF AGRICULTURE

NINE YEARS OF AGRICULTURAL INSTRUCTION WORK IN QUEBEC.....	101
NINE YEARS OF AGRICULTURAL INSTRUCTION WORK IN MACDONALD COLLEGE.....	108
SUMMER FALLOW SUBSTITUTES—GROWING GRAIN IN ROWS—by Manley Champlin, M.S., Sr. Professor of Field Husbandry, University of Saskatchewan.....	115
WHEY BUTTER, By H. H. Dean, B.S.A., Professor of Dairying, Ontario Agricultural College....	120
PROGRESS OF SEED POTATO CERTIFICATION IN BRITISH COLUMBIA, by C. Tice, Officer in Charge...	122

PART III.

AGRICULTURAL EDUCATION AND RELATED ACTIVITIES

AGRICULTURAL EDUCATION IN ONTARIO, by Dr. J. B. Dandeno, Inspector of Agricultural Classes..	126
THE SCHOOL IN THE RURAL COMMUNITY—CONCLUDED, by G. V. Van Tausk, M.A., B.Sc. (Oxon), B.S.A.....	127
THE SCHOOL EXHIBITION—WHEN AND WHERE, by J. W. Gibson, British Columbia; Dr. J. B. Dandeno, Ontario; S. T. Newton, Manitoba; F. W. Bates, B.A., M.Sc., Saskatchewan; L. A. DeWolfe, B.A., M.Sc., Nova Scotia; A. C. Gorham, M.Sc., New Brunswick.....	132

PART IV.

SPECIAL CONTRIBUTIONS, REPORTS OF AGRICULTURAL ORGANIZATIONS, PUBLICATIONS AND NOTES

RURAL CREDIT SYSTEMS, ONTARIO, by A. G. Farrow, Chairman Agricultural Development Board.....	141
ANNUAL AGRICULTURAL STATISTICS OF CANADA, by Ernest H. Godfrey, F.S.S., Dominion Bureau of Statistics.....	145
AGRICULTURAL PRODUCTION OF CANADA, in 1921, by Ernest H. Godfrey, F.S.S.	148
ROYAL AGRICULTURAL WINEER FAIR ASSOCIATION OF CANADA, by C. F. Bailey, Managing Director	152
NEWS ITEMS AND NOTES.....	154
ASSOCIATIONS AND SOCIETIES.....	156
APPOINTMENTS AND STAFF CHANGES.....	159
THE LIBRARY.....	160
NEW PUBLICATIONS.....	163

PART V.

THE INTERNATIONAL INSTITUTE OF AGRICULTURE

FOREIGN AGRICULTURAL INTELLIGENCE—	
CROPS AND CULTIVATION.....	165
LIVE STOCK AND BREEDING.....	172
RURAL ECONOMICS.....	172
AGRICULTURAL INDUSTRY.....	173
PLANT DISEASES.....	178
THE INTERNATIONAL REVIEW OF AGRICULTURAL ECONOMICS.....	176
AGRICULTURAL STATISTICS.....	177

The AGRICULTURAL GAZETTE OF CANADA

VOL. IX

MARCH-APRIL, 1922

No. 2

CORN: ITS HISTORY, PRODUCTION AND UTILIZATION—THE EUROPEAN CORN BORER

BY J. H. GRISDALE, B. AGR., D. A. Sc., DEPUTY MINISTER OF AGRICULTURE FOR CANADA

WHEN about 300 years ago the first European settlers arrived in the American Continent they brought with them seed of wheat, oats, barley and peas—the principal cereals grown in Europe at that time. Since then, wheat, the great bread crop, has been continuously produced on this Continent, and is now exported in greater quantities from this Continent than from any other part of the world. The United States has been known to produce over a billion bushels in a year and Canada's production has reached as high as a 400-million bushel mark. The production of oats, likewise, has reached astonishing proportions, the United States producing as high as 1½ billion bushels and Canada over half a billion. Barley and peas also have made a great mark, particularly barley, but none of these compare in quantity produced with the enormous production of a cereal found growing by the discoverer of this Continent some 425 years ago when first he landed here, namely Indian Corn or Maize.

The corn crop of all America together has in one year been known to surpass the startling figure of three billion bushels, or probably more than all other cereals put together.

As suggested, the corn crop is one that has long been cultivated in this country; as proof, Columbus in his report to Isabella, Queen of Spain, after his first voyage of discovery in 1498, stated that he had seen growing on this continent fields of corn eighteen miles long. Cartier, a few years later, in 1535, describes the Indian Village of Hochelaga (where Montreal now stands) as being surrounded by large fields of growing corn at the time of his visit. In 1685 the English, in connection with one of their wars with the Seneca Indians, claimed to have destroyed about 1,200,000 acres of corn in what is now the State of New York, and Frontenac in 1690 spent several days destroying corn in the same State in connection with his trouble with the Onondaga Indians. Other early explorers in the western parts of the United States and Canada, such as De Soto and Lasalle, make mention of large fields of corn. Thus, we have ample proof that corn was the great staple of the Indians long before the white man reached the shores of this continent.

European settlers early learned the use of this cereal from the Indians and, with them as with the Indians, it soon became the staple crop. Certain of the Commanders bringing over groups of colonists to the United States, gave them small areas of land on condition that they plant it with corn, showing the high esteem in which this crop was held by those responsible for the early development of this continent.

Corn, as just stated, was the great staple of the Indians; in fact, their whole life centered around it. The Indians venerated it and there were Corn Priests, Corn Directors, Corn Guardians and various other functionaries in connection with the production of the crop.

Their methods of cultivation, selection, seed testing, etc., astonishing to say differed but little from those of the present day. In cultural methods they did not, as do we, follow a rotation, but grew corn year after year on the same land until the field played out, when they changed to another field. They grew the corn in hills for the most part, planting usually seven seeds in the hill. They were careful to select the seed, choosing the ears with long straight rows of even kernels, and usually discarded the butt ends and tips. In many cases they tested the seed before planting, by allowing it to germinate either in small heaps or wrapped in what might have been called "the rag-doll" of that day—a layer of nettle leaves over which the seed was strewn thickly, loosely rolled up, tied with thongs and thoroughly wet and kept warm until the seed germinated, when the seed was planted, any not germinating or showing swollen germs being rejected.

The types grown then were, as they are to-day, the Flint and the Dent. The Indian used corn for human consumption only, of course, and the two types grown were used for different purposes: the Flint for making hominy and similar foods; the Dent for the production of flour. They, like ourselves, too, seemed to enjoy the roasted ear. In fact, the roasting of the corn was often celebrated as a feast, large quantities being husked and, after a pit had been excavated and a large quantity of brush and such material burned in it for some time, thus heating it to a high temperature, the corn was laid in it protected by layers of husks and covered over, left for 24 hours, then uncovered and the feast began.

As already suggested, the crop of corn in this country is enormous. The United States crop alone runs from two and a half to nearly three billion bushels of grain and from thirty-five to over forty million tons of ensilage or forage, the most of this latter crop being stored in about a half-million silos. For instance, New York State alone is supposed to have over 60,000 silos and another state, Wisconsin, has somewhere about the same number.

Canada's crop is astonishing when we think of the latitude of this country, namely, something over 15 million bushels of which Ontario alone produces about 13 million bushels.

In addition to the crop for grain, Canada produces about 6 million tons of corn for forage. Of this about 4½ million tons are produced in Ontario. It is estimated that this forage crop is housed in about 40,000 silos in the case of Ontario, with 14 or 15 thousand outside of that province. Outside of hay, silage is certainly the most important forage crop grown in this wide Dominion.

Corn for Silage

The production of corn for silage purposes is a somewhat different matter from production for seed or grain purposes and the cultural treatment of the soil somewhat different. At Ottawa we find that we secure best results when we spread the manure broadcast in the fall, winter and spring or, in other words, as it is made. This would, of course, be influenced somewhat by the topography of the farm, but on land not subject to inundation or serious washing, I believe this is the best method for applying manure. The manure is applied at from 12 to 20 tons per acre according to the supply. The ploughing is not done until as short a time before seeding as practicable, and the moment the land is ploughed it is rolled or packed then disked and well worked down, and seeding done as soon after ploughing as possible in rows 3½ feet apart. It is

then thinned by cross harrowing or, if on account of weather conditions this is not practicable, by means of a hoe so that the average stand does not exceed about one plant every eight or nine inches. The double horse cultivator is commonly used until the plants become so big as to be injured by straddling; then the single horse until the horse and man are no longer visible in the field. The corn is cut when in the late dough stage; is run through the cut-box and cut into as short pieces as possible, as the finer it is the better it will keep and the better will be the flavour. The varieties we find most satisfactory are, Wisconsin No. 7, Golden Glow and Early Learning, but possibly some large varieties might be more satisfactory in western Ontario. I have seen at least one most extraordinary field of Eureka growing at London.

At the Experimental Farm at Ottawa, the average cost to produce corn for the past four years has been \$57.62 per acre or \$3.52 per ton with an average yield of 16.4 ton per acre. A tabulated statement of the cost and returns would be as follows:—

Average for 4 years—1917, 1918, 1919 and 1920

Rent of land.. . . .	\$ 8 22*
Manure.. . . .	7 65†
Seed.. . . .	1 97
Machinery.. . . .	3 69
Twine.. . . .	77
Manual labour (40c. per hr.)..	24 75
Horse labour.. . . .	10 56
Cost per acre.. . . .	57 62
Yield per acre.. . . .	16.40 tons
Cost per ton.. . . .	\$ 3 52
Value per acre.. . . .	91 84
Profit per acre.. . . .	34 21

* Land value \$1.25 per acre.

† One-half value of manure.

(Variety mostly used, Wisconsin No. 7.)

The value per acre is figured on the selling price of hay which, in the average of four years, made the ensilage worth \$5.61 per ton.

The advantages of growing corn for ensilage in Canada are many, summarized briefly as follows:—

1. It is an exceedingly cheap feed since, over a period of 20 years, costs have run from \$1.50 to \$3.92 per ton when labour and supplies were most expensive.
2. Large returns per acre. The average crop in this period of time has been equal to about 5 tons of clover hay per acre.
3. Best crop on which to apply manure.
4. Best crop to use when breaking up a sod field.
5. Best crop for cleaning land.
6. Easiest crop to harvest as to weather conditions.
7. The crop most cheaply housed.
8. The crop most easily handled in feeding.
9. Best crop for supplementing dry pastures.
10. Best crop to help induce cattle to consume coarse and poor roughage.
11. Cheapest and best succulent food that can be grown in the provinces of Ontario and Quebec.
12. The crop that permits of the carrying of most live stock per acre.

In short, in Canada as in the United States, it is the stockman's crop par excellence, and now, in Canada as in the United States, this crop is greatly endangered by the appearance of a new pest; in fact, by the appearance of about the only pest that has been of any considerable menace to the crop since the white man started growing it on such an extensive scale on this continent. I refer to the European Corn Borer, which was discovered in Ontario in 1920, and to this pest I think the attention of every farmer in this eastern part of Canada should be drawn and his most intelligent co-operation in the attempts at control be asked.

European Corn Borer

First discovered on this continent in the vicinity of Boston, Mass., in summer of 1917. Found in Canada for the first time in Humberstone township, Wel-

land county, Ont., on August 10, 1920, by officers of the Entomological Branch. Between that date and the end of October, 1920, the pest was located in five townships in Welland and Haldimand counties and in thirty townships in the counties of Elgin, Kent, Middlesex, Huron and Oxford, a total of 2,780 square miles being infested.

The survey conducted by our officers in 1921 indicated that the corn borer is now present in sixty-five additional townships in the counties of Ontario, Lincoln, Welland, Haldimand, Wentworth, Wellington, Waterloo, Brant, Norfolk, Oxford, Perth, Huron, Middlesex, Lambton, Kent and Essex, the total infested area comprising 7,680 square miles, an alarming increase of 4,900 square miles in 1921. In all, 100 townships are now infested. The area with St. Thomas as a centre is the most heavily infested district; some fields of corn in 1921 being estimated to contain as many as 269,000 borers to the acre.

Every part of the corn plant except the smaller roots is attacked by the borer. In badly infested fields a total loss takes place, the work of the borer causing the plants to fall down completely. The insect passes the winter in the caterpillar stage in burrows, in corn stalks, corn refuse, etc.

The infestation in Ontario is recognized as the worst infestation under field

conditions in North America. Naturally, therefore, the United States Department of Agriculture is deeply concerned in the probability of the borer spreading westward to the great corn belt of the Mississippi Valley; and in view of this, an embargo has been placed on the province of Ontario which prohibits the importation of corn plants or corn on the cob and restricts the importation of certain cut flowers and vegetables likely to harbour the borer.

It is now recognized by all entomologists that the extermination of the insect is impossible. The Entomological Branch is doing everything it possibly can to prevent the spread of the insect by quarantining infested townships to prevent the movement of possibly infested plants, by the publication of timely articles, by visiting farmers in the worst infested districts, etc. Within the most heavily infested district we have established a research laboratory which is investigating the biology of the insect and using the information gained therefrom to further control measures. It is going to be a big fight, but we feel that if the farmers will adopt the control measures we recommend, Crop Protection Leaflet No. 16 *The Control of the European Corn Borer*, the insect will be kept within reasonable bounds and not interfere too seriously with the growing of corn. Our entomologists are in close touch with similar officials in the United States.

THE DOMINION EXPERIMENTAL FARMS THE PRINCE EDWARD ISLAND EXPERIMENTAL STATION

BY J. A. CLARK, B. S. A., SUPERINTENDENT

The accompanying article is the second of the Dominion Experimental Farms Series. It narrates in an interesting manner the work carried on at the Prince Edward Island Experimental Station, Charlottetown, and clearly indicates that the results have been of the utmost value to the farmers of "The Island Province."—*Editor.*

THE Experimental Station for this province as established at Charlottetown, Prince Edward Island, in August, 1909, had an area of 29 acres. This has been added to by purchase and lease, so that 150 acres are now available for experiment, research and investigational work. The original area "Ravenwood" was purchased by the Prince Edward Island government and leased to the Federal government on a long term lease for the above purposes. The Station farm is situated about one mile northeast of the business section of the city of Charlottetown, and along either side of the Prince Edward Island Railway. Its location adds much to the usefulness of the Station. The land on the east of the track has a general slope to the west, enabling travellers to see most of the farm crops throughout the season. From the Station buildings the land slopes away on all sides except on the north. Towards the railway on the west the hill is quite steep.

The soil is a dull red colour formed from the red sandstone (Triassic) that underlies the Province. In general it is a sandy loam underlaid with a hardpan of brick clay. The subsoil over a large area of the farm is so impervious to water that it was necessary to underdrain both the low areas and several sections of the higher land to fit them for uniform experimental work. Many different types of soil are represented. These range from almost pure

sand to heavy clay, with swamp areas of pure peat which have been reclaimed by drainage.

The Station is the Island farmer's headquarters for investigational and research work with pests, fertilizers, soils, crops, stock, and for information concerning the many hundred subdivisions which the problems connected with these divide themselves into. The farm problems of to-day increase in complexity. New conditions in regard to labour, machinery, transportation, and markets crowd in upon the farmer. He finds that to work out the solution of many of these problems alone is beyond his means and ability. Every farmer knows that in his occupation we have only just touched the fringe of the possibilities that lie on every hand. He knows that the balance between success and failure, between profit and loss, is often so close that only the touch of experienced advice is necessary to turn the balance in his favour. The Experimental Farm has won the confidence of those who use it. The number of these has steadily increased. This article is written to let the other few thousand farmers in the Province know of the work that is carried on for them, and we trust that we may soon have the privilege of serving them all. The Experimental Farm is a practical demonstration in co-operation. It has its place along with the great co-operative movements that have so great-

ly improved the quality of the finished products of the farm. All Canada, represented by the Government, carries on experiments at the Station to determine ways and means of improving farm practice, methods, stock and crops. The co-operative organizations then standardize, increase and insure the necessary volume to supply the ever increasing demand created.

The work carried on by the Station is naturally so varied in character and so diversified in its objects that it is difficult to present the situation in such a

instruction throughout the province as opportunity offers.

An Improved Barley Originated

Perhaps the most important investigational work was that which resulted in the origination of Charlottetown No. 80 barley. The original work with this grain was begun in 1912, and it was registered under the C. S. G. A. No. E-8596, in April, 1916. This barley has averaged about 8 bushels more per acre than the average of the 8 next best sorts at this Station for the last 9 years. It has practically replaced other sorts in



Cereal Test Plots: Prince Edward Island Experimental Station.

manner as to show the total results in the form of money. Many of the activities, during the past thirteen years, have led directly or indirectly to the financial benefit of the majority of the farmers of the province. It is possible, in some lines, to make a fairly close estimate. In others, the results are in one case so far reaching, and in another so successful, that it is impossible to demonstrate their value in figures.

The work may be divided roughly into investigation and research, demonstration of methods, assistance and actual

the province. It drops most of its awns in the fields, and is spoken of locally as a "farmer's barley." A conservative estimate would be that this superior sort has added 25,000 bushels more barley to the output of grain on the farms of the province. At \$1.50 per bushel, this would be \$37,000 per annum. Wherever this barley has been tested in other provinces, it has already demonstrated its superiority over most others, and its general use would probably add many million bushels to the barley crop of Canada.

Field Crop Investigation

Two series of experimental investigations have been conducted, in co-operation with a number of farmers in different districts of the province to determine the variety of oats best suited to Prince Edward Island conditions. The first test covered a period of five years, 1912-16, and the average returns from over 150 plots demonstrated that Banner oats was the leading variety. During the five seasons it produced 6 bushels and 2 pounds more grain than Old Island Black, and 7 bushels more grain per acre than Ligowo.

The second series of co-operative tests was with 12 farmers, for one year, with Banner and Victory oats, and the Banner oat again led in yield, and was much superior in colour and appearance to the Victory.

All promising new varieties of cereals originated through plant breeding at the Central Farm are tested out at the Charlottetown Farm. In addition to this, the best commercial sorts are all improved under the C. S. G. A. regulations by careful hand-selection. Each year the superior plants from each sort are propagated, multiplied, registered and sold as foundation stock to all who apply, the quantity distributed being governed by the amount of land available.

In the Division of Forage Crops, co-operative experiments with alfalfa have been carried out with farmers throughout the province. Inoculated soil has been sent out whenever requested, and while alfalfa is not believed to be as satisfactory a forage crop on Prince Edward Island as red clover, yet the farmers have received this information and have been saved the loss of having their fields bare. Many strains of alfalfa and other clovers have been tested over a period of years, and the hardiest recommended. Among the grasses, timothy stands in first place for hay. Red Top, orchard grass and meadow fescue

have shown that they are promising grasses for pasture.

The records show that corn cannot be counted on for a full crop every year, and the farmers are advised to sow oats, peas and vetches in mixture to replace corn in the off years. In good corn years, the oats, peas and vetches may be allowed to ripen, and will produce a heavy crop of grain. Work at this Station is only just being begun with sunflowers as a forage crop. In 1921 the Mammoth Russian produced 14 tons, 1,000 pounds per acre of green forage. This was fed to steers as a soiling crop. They ate heads, leaves and stalks clean. This method of feeding was recommended to a dairy farmer who had quite an area of sunflowers and no silo. He reported that his cows ate the sunflowers greedily and made good gains in their milk flow. Selected seed of the Mammoth Russian gave a good return of ripe seed.

Cultural Experiments

The work with roots has secured a turnip said to be resistant to club root; over 250 pounds of this seed being produced in 1921.

A series of six farm rotations was laid out in 1912, under a plan suited for demonstration. Accurate records have been kept, and the results from these different systems can be secured, not only through reports, bulletins and press articles, but every summer they are open to the eye of every farmer who passes on the train, or calls to spend a few hours at "the Farm." These have demonstrated methods of eradicating noxious weeds, and of steadily increasing the fertility of the land by applying manure at the rate of five tons per acre per year.

Perhaps the most interesting work, to the farmers, of all that has been undertaken by the Experimental Station is that connected with the cultivation of the soil by different methods. Over 300

plots are used in this investigational work. Several years were spent in draining and in getting the land as uniform as possible. The records now date back to 1916, and quite a number of press articles have been sent out based upon these experiments. A few of the deductions are: When seeding with a drill, rolling just before seeding gave better results than rolling after seeding, or when the grain was up. Fairly deep ploughing of sod (5 inches or over) gave better yields than shallow ploughing, and early autumn ploughing of sod gave much better crops than spring plough-

any spring ploughing. It is rather surprising to find that oats made one of the best nurse crops for seeding out land when sown at the rate of $2\frac{1}{2}$ bushels per acre. Barley sown at the rate of $1\frac{1}{2}$ bushels per acre gave 3 bushels and 12 pounds less grain than when sown thicker, but produced 600 pounds more clover the following year, and 1,200 pounds more timothy the second year than plots sown at the rate of $2\frac{1}{2}$ bushels of barley per acre.

The farmers, and more particularly the farmers' wives, that visit the Station every summer, take a very great interest



Experiments with Celery: Prince Edward Island Experimental Station.

ing. Land that has produced a hoed crop, such as potatoes or roots, usually produces a better crop if the seed bed is formed for the following grain crop without using the plough.

Results: Sod ploughed in August and top-worked in autumn gave 13 bushels and 5 pounds more oats per acre than sod ploughed the following spring. Even the poorest method of autumn ploughing gave 6 bushels per acre more oats than

in the gardens, orchards and small fruit plantations. In these, careful investigations have been carried on for many years to determine the best varieties of the different sorts of vegetables, fruits and flowers.

Experiments and demonstrations conducted with cultural and growing methods with all of the important vegetables and fruits, have enabled the Experimental Farm to greatly assist, and

THE AGRICULTURAL GAZETTE OF CANADA

to assure the success of a very large number of the home farm gardens. In fact, ripe tomatoes, which were a rare luxury in the province only a few years ago, are now common vegetables to be found throughout the country, selling at moderate prices.

Many of the better sorts of vegetables and flowers have been propagated for seed or tubers and sold or distributed to the schools, women's institutes and the farm homes of the province.

Live Stock Investigations

The Experimental Farm at Charlottetown was not planned originally for live stock work; enough stock was to be kept to operate the farm and to use the roughages and other surplus products from the investigational work with cereals and garden crops. Investigations in feeding lambs and steers have been carried on since the Farm was started; and valuable data on methods of feeding and housing have been published from time to time. An annual auction sale of stock always brings a large number of interested persons to the Farm. These are furnished with a detailed statement at the time of the sale, of the feeds, methods of feeding, and weights and gains of the animals auctioned. The kinds of pure bred stock now represented at the Farm are Clydesdale horses, Ayrshire cattle and Yorkshire pigs. Many of these have been shown at the leading fairs and exhibitions, and while no prize money has been accepted, a goodly number of the best prize ribbons now hang in the Superintendent's office.

The dairy cows are all entered in R. O. P. They have qualified in the past with good records. "Buttercup of Glenholm" No. 56491, this season broke the four-year-old record of Canada, giving 16,444 pounds of milk and 662 pounds of butter fat, with a test of 4.02 per cent. Three yearling bulls bred at this Station

are now at the head of the Ayrshire herds of three of the Experimental Stations in Eastern Canada.

Poultry Investigations

This Station led the way to one of the greatest advances that has ever been made in the poultry industry. The Dominion Egg-Laying Contest was started at Charlottetown in the autumn of 1918, and the success of the 1918-1919 contest has led to many others being started. These contests are now recognized as the most compelling force in the present very rapid development of the poultry industry. From these contests has grown the Record of Performance and the Registration of Poultry, which has enabled Canada to lead the whole world forward. The Experimental Farms System throughout Canada has adopted 150 eggs in the pullet year as the minimum for all breeding hens on the Farms.

The average profit over cost of feed on all the hens in the three Prince Edward Island contests was \$1.21 per hen. Estimating that the average hen in Canada earns a net profit of \$1 per annum, which is more than she does, and that as a result of the contests now being carried on, the profit may be increased to the average of the Prince Edward Island Egg Laying Contests, then the 31,324,498 fowls in Canada would earn a net profit of 21 cents more than at present, or in round numbers, they would produce \$6,500 000 to the financial advantage of Canada.

Drainage of Agricultural Land

When the Experimental Station was established in 1909, at Charlottetown, modern tile drains had not been laid, so far as we know, for agricultural purposes, in the province. The drainage of a large area of unprofitable land at the Station produced remarkable results.

This land, which did not produce enough barley to re-seed the land in 1910, has since produced over 50 bushels of barley, 35 bushels of wheat and 80 bushels of oats, respectively, per acre.

Experiments were conducted with subterranean outlet, and it has been demonstrated that a four-inch hole, drilled almost anywhere in the province to the level of the general water table, will carry off the water from a "pot-hole" or other swamp area not exceeding one acre in extent. One such outlet was observed to carry off the surface water at the rate of 20,000 gallons per day.

Bee Investigations

Many investigations have been carried on with breeds of bees, methods of preventing swarming, wintering of bees, and means of combating bee diseases. Beekeepers who have any difficulties are asked to apply as early in the season as

possible to the Experimental Farm for assistance. This we are ready to furnish to the limit of our ability. Last season the Bee Inspector visited every apiary that could be located in the province, and gave personal assistance or instruction. Demonstrations were given from time to time at the Station and at 5 centres throughout the Island to encourage those interested in this profitable phase of farming.

It is not possible in an article of this kind to sum up all the phases of the work and the discoveries that have been made. The majority of our activities are of such a character that it is impossible to make a reasonably correct financial estimate of their value to the province. The above facts, however, show some of the operations and policies, and are presented with the idea of enabling the farmers to make still more profitable use of their own Experimental Farm.

"There are many under-nourished or improperly fed children in this country, whose condition, both physical and mental, would be greatly improved by a more liberal use of milk in the diet."—*Dr. J. A. Amyot, Deputy Minister of Health.*

"Canada is one of the few remaining countries that offer agricultural lands on terms within the means of settlers of limited capital, located in a land of democratic self-government and with a climate acceptable and desirable to the white race."—*Agricultural and Industrial Progress in Canada.*

THE REINDEER INDUSTRY

BY E. A. WATSON, CAPT. C.A.V.C., CHIEF ANIMAL PATHOLOGIST, HEALTH OF ANIMALS BRANCH

TOWARDS the end of October, 1921, there was landed at Amadjuak, Baffin Island, a herd of domesticated Norwegian reindeer. The shipment was made by the Hudson's Bay Reindeer Company, and marks the beginning of an enterprise worthy of the traditions of the great company of "Gentlemen Adventurers" who have figured so prominently in Canadian history and development for two hundred and fifty years.

Further importations of reindeer are expected to follow, the plans of the company being to establish reindeer depots at various points in the northern terri-

genous to this country, the cariboo at one time inhabited the wooded swamps from Newfoundland to the Pacific Coast. Further north the arctic variety roamed in vast herds over the barren lands and the territories in Canada and Alaska north of the tree line. But in recent years reports of the failing numbers of the cariboo, and in many districts their complete disappearance, have come in from all quarters, from Esquimo and Indian tribes and experienced hunters alike. It would appear that the story of the vanishing buffalo and the starving Indians is to repeat itself with the cariboo and the northern tribes.



tries of Canada, and to develop an animal industry which will provide the means of subsistence to the native population and a new and increasing source of meat supply for southern markets.

Identical with the cariboo species, the reindeer does not figure in the popular mind as a domesticated animal and, in this country particularly, is regarded more or less as a wild creature to be hunted and shot down for food by prospectors, trappers, hunters, and explorers or as trophy for the man with a rifle who has just the desire to kill. Indi-

In northern Europe and Asia the Laplanders and tribes of Mongolian descent, as far back as their history can be traced, have lived on the native reindeer. These animals have furnished them with meat and milk, skins and clothing, with the means of transportation and the material for barter and exchange—in fact with practically all that was needed in their simple nomadic style of life. For ages past these people have been domesticating wild deer and raising herds of trained animals. But with the fringe of civilization penetrating their territories, with

the advent of missionaries, traders, tourists, collectors, and sportsmen, and with the accompanying ruthless slaughter of reindeer, the Laplanders saw their means of self-support and existence threatened. Realizing the danger in time, they built up their domesticated herds and firmly established their one and only industry. They now have reindeer in plenty for their own needs and export; and they furnish many of the Scandinavian and Russian cities with reindeer meat, which commands a price about equal with that of the best beef. To one not born to it, the Lappish life seems to be a hard one. But these people are of a hardy race and they love their mountainous plateaux, the great tundras, and the open life, whether it be in the treeless, snowy wastes of winter, when for three months the sun does not appear above the horizon, or during their sojourn on the fjord islands through the brief spring and the summer months of the midnight sun.

In April the flocks are brought from the interior to the coastal regions, and in many cases on to the islands. The deer enjoy the salt water and a swim of two miles or more across one of the fjords. They are carefully tended during the fawning season, and remain on the islands through the summer months to escape the plague of mosquitoes—the “grey terror” of Lapland—and grow fat. A cold rainy season is best for the deer. There is then an abundance of the moss on which the animals feed and thrive so well, and in September when the return journey to the winter ranges in the interior is commenced, they should be in a sleek and well rounded off condition with a slab of back-fat which will be needed and used up during the long, lean months of winter. It is said that a full-grown male deer should have in September a slab of back-fat three inches or more in thickness.

In summer the Laps move with pack-reindeer; but in the winter time, when most of the overland travel and work is carried on, sledge-reindeer are used en-

tirely. The flocks are then concentrated in the vicinity of the Lap villages, and the best and strongest male animals are broken to the harness. The sledge, called a pulka, is made of wood and shaped like a little narrow boat with pointed bow and square stern and with a rounded and keel-like bottom. It is usually made rather less than seven feet in length, though some measure up to nine feet, and is just wide enough for one person to sit in. A good draught reindeer will draw a load of from 250 to 300 pounds weight according to the condition of the snow. Winter transport and communication between the widely separated Lappish communities, to and from the coast with market produce and winter supplies, across Norwegian, Swedish, Finnish, and Russian Lapland, and the carrying of the overland mails, is done entirely with reindeer. The usual custom is to form a transport column of reindeer and pulka tied together in a single file. This is called a “radio.” On October 1 of last year, after the first heavy snowfall, the writer met several of these “raido” proceeding from the coast to the interior with the first loads of winter supplies. The snow was soft and the going slow and difficult. But when the snow is packed hard, travel is easy and rapid, and it is possible to cover 65 to 70 miles in a day. A great advantage of reindeer transport is that it is seldom necessary to carry food for the animals. They find it for themselves at the halting places en route, digging deep down through the snow to get the coveted moss. Furthermore, they have a reserve power which enables them to cover great distances with little or no food at all. With his remarkable spreading hoof a reindeer supports himself well on the crusted snow or, as in the summer season, picks his way safely and quickly among the mountain rocks and swamps where any other domesticated animal would find it hard to keep a footing.

Apart from his adaptability and usefulness as a beast of burden, the rein-

THE AGRICULTURAL GAZETTE OF CANADA

deer is a valuable food-producing animal. A Lapp, Johan Turi, has written in his book of Lappish texts that:—

“Man shall tend the reindeer, and the reindeer shall again provide livelihood for man, as to clothing and food. And man shall move with the reindeer back and forth, south and north; the pack-reindeer he uses as a means of transport, and the other loose reindeer are the herd.”

True it is that the reindeer is unique among man's animals in that it fur-

cessible field of exploitation up to the present time. The reindeer industry may be the means of opening the way to progress and development in the Northland.

It should be mentioned here that this importation of reindeer by the Hudson's Bay Company is not the first experiment of its kind on this continent. In 1898 the United States government imported reindeer into the Yukon territory for the relief of the miners, and drove a herd up into Alaska for the relief of



Hudson's Bay Company herd of Lapland Reindeer crossing the Alten River, Finmark, for embarkation to Baffin Land, Canada

nishes altogether food, clothing and the means of transport. There is no other animal whose cost of maintenance is so small and whose return to man so relatively large.

This animal then appears to be admirably suited for the stocking of the vast non-producing lands of Northern Canada. It is known that these lands possess considerable natural resources and untouched wealth in oil and minerals. The unsolved problem of food and transportation has made this an inac-

shipwrecked crews of whaling ships. They then promoted the industry among the Esquimo tribes and mission stations, and by all accounts the herds have multiplied rapidly and now number many thousands of animals. Increasing quantities of reindeer meat are shipped south annually and marketed in United States cities. Some fifteen years ago a small herd of reindeer was shipped from Norway to Dr. Grenfell's mission on the coast of Labrador. It is said that the herd prospered well for the two or three

years it remained under the care of Lap herders, but became scattered and fell to pieces after the return of the Laps to their native land.

The Hudson's Bay Company wisely arranged for experienced Lap herders with their families to accompany the expedition to Baffin Island. A depot of supplies, building material and equipment has been established at Amadjuak for the Lap settlement. Pulka and skis for travel, sport and recreation, medical stores, books and reading matter have also been provided, the company anticipating the needs and requirements of these people, desiring their welfare and that they should form a happy, useful and contented colony.

The Department of Agriculture is interested in the reindeer industry as in all branches of live stock. Reindeer, hardy animals as they are, are subject to certain diseases and parasitical infestations. The writer, acting under the instructions of the Veterinary Director General, was sent to Norway to co-

operate with the Hudson's Bay Company in guarding against the introduction of disease with the imported animals and in giving the expedition a fair start and prospect of success. The conditions of the industry in Lapland were studied and a thorough inspection of the animals was made while they were being gathered up and again before actual embarkation. Six hundred and twenty-eight reindeer with a clean bill of health sailed for Baffin Land on the Hudson's Bay Company's steamship *Nascopie*, and excepting some casualties on the rough voyage across, were landed in good condition. The venture will be followed with much interest and hope for its success. Such an enterprise is a costly one and the Hudson's Bay Company is to be congratulated on the courage and thoroughness with which it has undertaken it. The reindeer industry may prove as applicable for parts of northern Quebec and New Ontario as for the lands farther north.

NEW VARIETIES OF APPLES ORIGINATED AT THE CENTRAL EXPERIMENTAL FARM

BY W. T. MACOUN, DOMINION HORTICULTURIST

IT is not our purpose to describe at length in this paper all the work that has been done at the Central Experimental Farm, Ottawa, in the origination of varieties of early and late apples suited to the requirements of the province of Quebec and to districts where a similar climate prevails, but rather to confine our remarks to what has been obtained when McIntosh and Northern Spy have been used as parents, as it is from these two varieties that the greatest promise is presented. From the McIntosh have been originated very promising sorts to cover the season from mid-August to December, and from the Northern Spy late keeping varieties that are also very promising.

Seedlings of McIntosh

The parents used with McIntosh for the purpose of obtaining longer keeping varieties than McIntosh have been Lawver, Milwaukee, Malinda, and others, and although quite a number have been originated which are handsome in appearance and late keepers, none of them has been good enough in quality to come up to our ideal of what is desired. On the other hand, open pollinated McIntosh have given a large proportion of apples of good quality, handsome appearance, and of sufficient hardness to withstand the test winter of 1917-18, and it is to five of these that we wish to call special attention.

Melba.—This is a seedling of McIntosh, which comes into condition in August, and has a relatively long season for a summer apple. It is of good size, handsome appearance, and very good quality. This is a red summer apple, comparing very favourably with McIntosh in appearance and quality. The tree is an early bearer, and it is a good cropper. This variety is firmer than most summer apples and should make a good shipper. We have no hesitation in recommending this for general planting in the province of Quebec where McIntosh succeeds. It is expected that there will be a few trees for sale in 1922 and more in 1923. The policy has been decided on of offering new varieties for sale until they can be obtained in quantity from nurserymen.

Joyce.—Also a McIntosh seedling fit for use from two to three weeks later than Melba, and continuing in season through September and October. It is of good medium size, a red apple, attractive in appearance, good to very good in quality, comparing very favourably in quality with McIntosh itself. While, perhaps, not quite as early a bearer as Melba, it is a fairly early bearer, and we highly recommend this to follow Melba in season. This also is being propagated for sale, a very few trees being available in the spring of 1922.

Pedro.—This McIntosh seedling is in season from late September to December, being ready for use about three weeks after the Joyce, and keeping much longer. It is, perhaps, the handsomest of the three, being a lively attractive shade of red and having a perfume. While the Melba and Joyce are subacid, this may be called briskly subacid. The quality is good. This variety is recommended to replace Wealthy when an apple of better quality is desired. The tree is evidently very hardy, is a vigorous grower, and is a regular and heavy bearer. Trees of this will soon be available in quantity as it is a variety which

it is believed will soon make a name for itself.

Lobo.—Lobo is a McIntosh seedling, which is in season just before McIntosh, following the Pedro by two or three weeks. This is one of the most highly coloured of the McIntosh seedlings, and has already fruited in the province of Quebec, and is considered very promising for Quebec to come in before McIntosh. It is very like McIntosh in flavour. Trees of this variety are being propagated for sale.

Patricia.—By some persons, the Patricia is considered the best dessert apple of all these McIntosh seedlings, but, as a commercial apple, it may not prove quite large enough unless severely thinned, as it bears very heavily in rope-like masses. The character of flesh of this apple is superior to any of the others, and the quality is also very good. The fruit is deep red in colour, and is in season from October to December. This is particularly recommended for home use.

Many more seedlings of McIntosh have fruited, some of which have been named, but the foregoing five varieties are the ones which it is our purpose to introduce as rapidly as possible as it is believed that they are a real acquisition to the varieties now being grown. From the open pollinated seedlings of McIntosh there have been very few which are later in season than McIntosh, and those which are later are not good enough in quality.

Seedlings of Northern Spy

The Northern Spy has been crossed with Milwaukee, Lawver, North Western Greening, Walbridge, and others at Ottawa in the hope of obtaining hardy late keeping apples of good quality and while from these crosses many long keeping sorts have been obtained, most of them are not quite good enough in quality to meet our desire. On the other hand, from open pollinated trees there

have been a large number of seedlings of good quality, some of which are long keeping apples.

The Northern Spy is long in coming into bearing, and the seedlings of it have been later in bearing, on the whole, than the McIntosh seedlings; hence they have not been under observation so long, and we cannot speak as confidently of the hardiness of these as of the varieties previously described. However, a number of them withstood the test winter of 1917-18 and, while another test winter is desired to note its effect on a larger number of trees of these promising sorts, yet the names and characteristics of some of these may be mentioned as they are certainly better in quality than such varieties as Scott Winter and Bethel, and have a good deal of the Spy flavour.

There are eleven of these winter seedlings of Northern Spy which have been named and which may be briefly described here as at least one or two of them will, no doubt, be found hardy enough for commercial planting. They are referred to alphabetically as they are all good in quality and, as hardiness is the first consideration after quality, and their relative hardiness is not certain yet, it is thought that this is the best way to refer to them.

Ascot.—Fruit medium to large in size, roundish to oblate; predominant colour crimson; flesh yellowish with traces of red, crisp, tender, juicy; flavour subacid, pleasant; quality good; season November to middle of February or later. Resembles Northern Spy a little in outward appearance and considerably in flesh and flavour.

Bingo.—Fruit above medium to large, roundish conical; predominant colour crimson; flesh yellowish with traces of red, tender, moderately juicy; flavour subacid, sprightly, spicy, pleasant; quality good; season December to late winter. Resembles Northern Spy considerably in outward appearance, flesh and flavour.

Donald.—Fruit above medium to large, oblate to roundish, regular; predom-

inant colour crimson; flesh yellowish, crisp, tender, rather coarse, juicy; flavour subacid, sprightly, pleasant; quality good; season late October to March or later. A handsome apple, resembling Northern Spy somewhat in colour.

Elmer.—Fruit medium in size, roundish; predominant colour deep crimson; flesh yellowish, crisp, tender, juicy; flavour subacid, sprightly, pleasant; quality good; season January to late winter. Looks and tastes considerably like Northern Spy.

Emilia.—Fruit medium to above medium size, roundish conical; predominant colour crimson; flesh dull white, crisp, juicy, tender; flavour briskly subacid, pleasant; quality good to very good; season December, probably to April. Resembles Northern Spy in colour, shape, flesh and flavour. One of the best but also one of the latest to come into bearing.

Niobe.—Fruit above medium size, roundish, regular; predominant colour rather dull crimson; flesh yellowish, crisp, tender, moderately juicy; flavour mildly subacid, but sprightly, pleasant; quality good to very good; season December to late winter. Resembles Northern Spy a little in outward appearance and considerably in flavour. Very popular with most who try it. One of the first to come into bearing, but tree does not seem quite as hardy as some of the others.

Rosalie.—Fruit above medium size, roundish; predominant colour dull carmine; flesh white, crisp, tender, juicy; flavour subacid, sprightly, spicy, pleasant; quality good; season late November probably through the winter. Somewhat like Northern Spy in character of flesh and flavour. Not quite attractive enough in appearance.

Sparta.—Fruit medium size, roundish; predominant colour crimson; flesh yellowish, crisp, juicy; flavour briskly subacid, pleasant; quality good; season December to late winter. Resembles Northern Spy somewhat in flesh and flavour.

Spioffa.—Fruit medium to large, oblate to roundish conic; predominant colour crimson; flesh dull white or yellowish, crisp, tender, juicy; flavour briskly subacid, pleasant; quality good; season November to February or later. Resembles Northern Spy considerably in colour, flesh and flavour.

Spiro.—Fruit medium size, oblate to roundish; predominant colour deep crimson; flesh yellowish, crisp, tender, juicy; flavour subacid, sprightly, pleasant; quality good; season November, probably to March or later. Resembles Northern Spy considerably in flesh and flavour.

Wilgar.—Fruit above medium to large, roundish conical; predominant colour crimson; flesh yellowish, tender, juicy; flavour subacid, pleasant, though not high; quality good; season December to March. Resembles Northern Spy considerably in outward appearance, colour, shape, flesh and flavour.

The length of time required to originate, fruit, and popularize a new apple is very considerable. The first seed from which promising varieties have come

was sown at the Experimental Farm in 1898, or twenty-three years ago, but it is expected that it will take nearly twenty years more before certain varieties, which are now being propagated for dissemination will have produced fruit enough so that one can find it in large quantities on the market.

Following are the various stages through which a new variety must pass from the sowing of the seed until fruit is obtained in large quantities:—

	Years
From sowing seed to planting seedling trees in fruiting rows.	3
From planting to bearing.	5
From bearing to confirming characteristics of fruit.	5
From propagation to setting in orchard.	3
From planting propagated trees in orchard to fruiting of same.	6
If approved by nurserymen, time for nurserymen to build up a stock for sale.	3
From time of sale until trees are in full bearing in fruit growers' orchards.	10
To popularize fruit after it is available.	5
Total.	40

THE DOMINION EDUCATIONAL BUTTER SCORING CONTEST, 1921—FINAL RESULTS

BY GEORGE H. BARR, CHIEF, DAIRY DIVISION

THE contest covered six months from May to October inclusive. All the provinces provided a 14 pound box sample from a different creamery each month, except British Columbia, which did not send a sample in October, making a total of 53 creameries participating in the contest.

Of these, 32 had sent samples to the 1919 and 1920 contests, leaving 21 which had not competed before. The butter from these 21 creameries was quite close as regards texture, with the moisture fairly well incorporated, which indicates that the buttermakers throughout the Dominion are making a fairly uniform type of creamery butter, and I think it can be justly said that the Dominion Educational Butter Scoring Contest has

played an important part in bringing this about.

The scores for flavour in 1921 were considerably higher than in the 1920 contest, the percentages being as follows:—

50.9	per cent of the samples graded	Specials
34.0	"	" No. 1
15.1	"	" No. 2

STANDING BY PROVINCES ACCORDING TO GRADES

	Special Grade	First Grade	Second Grade
1. Manitoba.	6	1	1
2. Quebec.	5	2	1
3. Saskatchewan.	4	3	1
4. Alberta.	3	3	1
5. British Columbia.	2	2	2
6. Prince Edward Island.	2	2	1
7. Nova Scotia.	3	2	2
8. Ontario.	1	3	2
9. New Brunswick.	1	3	2

THE AGRICULTURAL GAZETTE OF CANADA

Average of the scores for flavour and total scores on all samples from each province:—

—	Average Score for Flavour	Average Total Score
Manitoba.....	41.95	96.65
Quebec.....	41.41	96.16
Alberta.....	41.16	95.85
Saskatchewan.....	40.91	95.26
Nova Scotia.....	40.08	94.31
British Columbia.....	40.10	94.04
Ontario.....	39.41	93.70
Prince Edward Island.....	39.50	93.36
New Brunswick.....	39.16	92.83

Standing for Workmanship by provinces based on the scores for texture, Incorporation of Moisture, Colour, Salting and Packing; total 55 points:—

	Average of Scores
Quebec.....	5.75 points
Manitoba.....	54.70 "
Alberta.....	54.68 "
Saskatchewan.....	54.35 "
Ontario.....	54.28 "
Nova Scotia.....	54.23 "
British Columbia.....	54.04 "
Prince Edward Island.....	53.95 "
New Brunswick.....	53.66 "

Number of samples from each province scoring full for Texture, Incorporation of Moisture, Colour, Salting and Package:—

—	Texture	Incorporation of Moisture	Colour	Salting	Package
British Columbia.....	3	3	2	4	4
Alberta.....	2	6	5	6	6
Saskatchewan.....	2	4	3	6	3
Manitoba.....	3	6	4	6	6
Ontario.....	1	4	5	6	4
Quebec.....	3	5	5	6	6
New Brunswick.....	3	2	3	3	4
Nova Scotia.....	3	3	5	4	6
Prince Edward Island.....	1	4	4	4	2
Totals.....	21	37	36	45	41

"The finest proof of the standing of agricultural education in Canada and the excellence of the agricultural colleges of the Dominion was given at the Chicago International Livestock Exposition when the Ontario Agricultural College at Guelph, the Manitoba Agricultural College at Winnipeg, and the Macdonald Agricultural College of Quebec covered themselves with glory in the judging contests, winning the first prize in individual standing as well as other awards."—*Agricultural and Industrial Progress in Canada.*

PART II

Provincial Departments of Agriculture

AGRICULTURAL INSTRUCTION IN QUEBEC

Particulars of Work Performed under the Agricultural Instruction Act during the First Nine Years of Operation

ONE of the conditions of the agreement entered upon by the Dominion Minister of Agriculture and the Quebec Minister of Agriculture was that there should be no reduction in provincial appropriations, in other words, that the Dominion subsidy was not to be applied to any extension or educational work already arranged for, but that it should be used for the furtherance of the work, especially school agriculture and post school work. Not only has this requirement been faithfully complied with, but the appropriations voted by the Quebec Legislature have been substantially increased year by year. The total amount spent in 1912-13 was only \$436,133, while it had reached the sum of \$1,162,103 in 1920-21, not including the Dominion subsidy, amounting to \$271,113.76.

Several new divisions were created during the last nine years and considerable work was done, as may be seen by the following brief summary.

Agricultural Colleges

There are three agricultural colleges in the province of Quebec: Macdonald College, affiliated to McGill University; the agricultural school of Ste-Anne de la Pocatière, affiliated to the Laval University, Quebec; and the Oka Agricultural Institute, affiliated to Montreal University. All three are subsidized. A fourth institution for the teaching of agriculture will be built at Rimouski in 1922;

it will be the property of the Quebec Government; the three above-named colleges belong to corporations.

The complete course is of four years, and a degree of B.S.A. is given. There is also a course of two years and several short courses.

As a special report is to be supplied by Macdonald College, it will be sufficient to give some information on the Ste. Anne school and the Oka Agricultural Institute.

The Ste-Anne de la Pocatière school was founded in 1859. Before 1913, it could accommodate only sixty pupils, but an annex was built since at a cost of \$108,000, and it can now receive 125 pupils. A grant of \$60,000 was given for this construction. In 1913 there were five teachers; there are now thirteen. Several of them have completed their course of studies in American or European universities. The laboratories of chemistry, microscopy, plant pathology, botany, cereals, and physics have been reorganized. The professors of the school have also done considerable teaching work outside of their institution in the counties of Lower Quebec. They have given short courses in 52 parishes of their district, as well as a large number of lectures and demonstrations.

The Oka Agricultural Institute dates from 1893. There are 17 professors at this institute, several of whom have studied at Guelph, Cornell or in Europe.

With the help of a subsidy of \$50,000, payable in ten annuities of \$5,000, an annex was built in 1914 at a cost of \$62,000, which has enabled the management to receive a larger number of pupils and better equip the scientific laboratories and museums.

During these nine years, the Oka Agricultural Institute has continually endeavoured to improve its agricultural teaching. Before the Agricultural Instruction Act was adopted, the duration of the course was three years; it is now four years and it includes all the branches of agriculture taught in agricultural institutions of other provinces. Up to date, 110 pupils have obtained their diplomas of B.S.A.

In addition to class work, the pupils go through a splendid course of practical training by means of daily labour and daily observations in the various departments of the farm. With this view and in order to make teaching more efficient, several departments have made purchases or accomplished work which is worthy of mention. Pure bred cattle and horses of high breeding were purchased by the live stock department. A judging arena was constructed, the cow testing work, officially started in 1918 and scrupulously carried out, has been the means of putting through for the Record of Performance 38 cows, with an average production of over 10,000 pounds of milk.

The fruit-growing department has made a number of experiments on orchard spraying and arranged each year for fruit-packing competitions. This department has also competed in a number of provincial exhibitions and won several gold medals, notably at Quebec and Sherbrooke, as well as the first prize at the fruit exhibition held at Ottawa in the autumn of 1921.

The poultry department has carried on very interesting experiments on the value of green food in the feeding of fowls and the advantages of caponizing for the market. Many competitions have

been organized by the superintendent and his assistants on judging fowls for the fairs, the killing of fowls, as well as the laying contests. Lastly, after many years of careful work, the Oka Agricultural Institute has introduced a new breed of fowls, "Chantecler," created by Rev. Bro. Wilfrid, superintendent of the poultry department, and registered in the Standard of Perfection in 1921.

Two valuable bulletins were prepared by professors of the Oka Agricultural Institute and distributed by the provincial Department of Agriculture: "Fruit culture" by Rev. Fr. Léopold and "Ten Years Experience in Poultry Work," by Rev. Bro. Wilfrid.

The agricultural school of Ste-Anne de la Pocatière, the Oka Agricultural Institute and the Macdonald College have received in 1921 \$120,500, of which \$75,000 came from the Federal grant.

School of Veterinary Science

The School of Veterinary Science is affiliated to the University of Montreal. It receives a grant from the provincial government and also one from the Dominion Government, under the Agricultural Instruction Act. This school has made great progress since 1913. The programme has been improved, the number of courses has been increased, a veterinary hospital has been built, for which it has received a special subsidy of \$5,000 per year since 1918. It has been recently decided that, starting from this year, the third and fourth-year pupils must spend at least four weeks at the Oka Agricultural Institute.

The school of Veterinary Science has recently been recognized as an accredited school by the American Veterinary Association.

Unfortunately, there has been a tendency towards a decrease in the number of pupils during the last few years. This is due to several causes but mainly to special conditions arising from the war. However, ten new students registered in the month of September, 1921.

Domestic Science Schools

There were 34 domestic science schools in 1913; there are now 65. The most important of these schools are that of Roberval, the first domestic science school in America, being established in 1882; that of St-Pascal, the provincial domestic science school of Montreal, those of Macdonald College, Sutton, Montebello, and Ste-Martine. These institutions receive grants varying from \$1,000 to \$3,000 per year. The others receive \$300 each per year.

Most of the professors in these schools have qualified in domestic science at the Roberval, St-Pascal, Montreal and Sutton schools, which give special courses for teachers.

Most of these schools are well equipped; all sorts of domestic work are taught as well as all the farm work that farmers' wives may be called upon to perform, and specially bee-keeping, poultry keeping and horticulture. Most convents have spinning wheels, and weaving looms. Our domestic science schools are attended by over 8,600 pupils.

The total grants received amount to \$51,000 of which \$10,000 comes from the Dominion subsidy.

Field Crops and Livestock

The greater part of the grants which were given for the development of this branch under the Agricultural Instruction Act have been spent on seed selection and on the maintenance of demonstration plots.

A clover seed production campaign has been conducted in almost all the districts of the province, for demonstrating the advantages of clover seed growing and encouraging the farmers to grow their own seed. During the last few years, two or three clover seed hullers operated by the Department, and threshing demonstrations were given in the main clover growing centres. The clover seed crop almost nil ten years ago, is now an important crop.

During the winter of 1920-21, some 1,257,113 pounds of clover seed were threshed by the farmers. Of this quantity, 52,738 pounds were threshed in various districts by the machines of the Quebec Department of Agriculture.

As regards the production of cereal seed, a number of lectures were given by our special officers on the choice of varieties and the selection of seed. A great many field crop competitions and seed fairs were organized with the co-operation of the Dominion Department. It is mainly through these efforts that the farmers of the province have come to realize the advantages derived from the use of good seed, and that a general scheme of organization insuring rapid progress in the production of choice cereals in the province of Quebec has been carried out.

Space does not permit to enumerate all the work done for the development of live stock by our agriculturists, the officials and instructors of the council of agriculture, which constitutes a branch of this Department. The assistance given towards the live stock industry includes many subsidies given to agricultural associations and farmers' clubs.

Besides, the greater part of the money spent to promote live stock breeding is voted by the Legislature and only \$9,000 of this amount has come from the Dominion grant for the last few years. This amount has enabled us to secure the services of some new instructors, who are doing excellent work with the co-operation of the Dominion Live Stock Branch.

Poultry Keeping

A great change has taken place in poultry keeping during the last ten years. It may be said that scientific poultry keeping was unknown or almost unknown in 1910. Since then, scientific methods of breeding and marketing have been introduced throughout the province, and these are becoming better

THE AGRICULTURAL GAZETTE OF CANADA

known and more generally adopted year by year. The chief of these methods may be enumerated as follows:—

1. Introduction in all districts of hygienic poultry houses, termed "Cold poultry houses," independent from stables and barns, where for the last three centuries poultry and cattle have been living together. This change necessitated a rather radical selection, as degenerated flocks do not stand the cold.

2. Establishment of fattening stations, which have also helped in selection work, so necessary. As early as 1912 some twenty-two stations fattened in three months 30,000 chickens with a profit of from \$2 to \$3 per dozen.

3. Introduction of pure-bred breeding fowls, of the utility type.

4. Gradual establishment of small breeding stations, under the supervision of special instructors. The average number of poultry stations operating each year for the last ten years has been twenty. The total is at least two hundred.

5. Distribution of eggs from pure-bred fowls to boys' and girls' clubs and women's institutes. From 30,000 to 35,000 eggs are now distributed yearly.

6. Organization of special stations for co-operative incubation; actual number, 5. Individual hatching capacity per year, 15,000 to 30,000 eggs.

7. Assistance given in various districts to the construction of farm poultry houses. The owners of these poultry houses agree, as a return for this assistance, to submit to some measure of control and supervision by the Department of Agriculture for the following years.

8. Establishment of a regular poultry division which has employed for years some fifteen officials, the latter following short courses, exhibitions, supervising stations and competitions, and giving lectures and demonstrations.

9. Organization in 1919 of a provincial poultry association which becomes the central body for the fifteen districts, and other associations.

10. Encouragement given to the raising of rabbits and turkeys and to the creation of a breed of fowls, the "Chantecler," specially adapted to the climatic conditions of this province.

In 1920-21 the poultry division had at its disposal a total grant of \$33,000, of which \$18,000 came from the Dominion subsidy.

Horticulture

The following comparative statement for the years 1913 and 1921 will give an idea of the development of horticulture:—

1913

8 instructors.
30 fruit-growing stations.
No other field of demonstration than the
30 above mentioned stations.

9,308 school-gardeners in 284 schools.
84 lectures given, 700 demonstrations
and 1,050 visits.
10 school fairs.
Only two publications on horticulture.

1921

21 instructors..
34 fruit-growing stations.
12 fields, vegetable growing.
47 fields, potatoes.
67 fields, small fruits (bush).
22 fields, tobacco, and in 1919, 37 fields,
sugar beet.
21,217 school-gardeners in 1,205 schools.
390 lectures, 2,076 demonstrations and
5,251 visits.
111 school fairs.
Since 1914, 14 publications printed.

Among the most important results obtained during the last nine years, special mention should be made of 125,000 apple trees, 900,000 strawberry plants and 20,000 raspberry bushes, not including ornamental trees and other shrubs,

distributed throughout the province by the horticultural division, so that the members of horticultural organizations might secure trees and shrubs of known quality. It is a well-known fact that the growing of fruit, vegetables, flowers, to-

bacco, and potatoes, as well as the canning industry and the horticultural industry, specially among the young, has greatly developed in this province since 1914.

The horticultural division was established in 1914. Its total appropriation in 1920-21 was \$69,000, of which \$39,000 came from the Dominion subsidy.

Dairying

The Dominion subsidy has been of great assistance in the development of the dairying industry in general and of our system of inspection in particular. During a few years, a total amount of \$25,000 was set aside for the salaries and the travelling expenses of inspectors, but owing to the fact that the provincial appropriations were constantly increased, this federal grant was reduced to \$5,000.

The butter and cheese factories' inspection staff includes 49 inspectors, covering the whole province. These inspectors are under the direction of five assistant-general inspectors, each of whom is responsible for nine or ten districts. These assistants are themselves responsible to the general inspector of butter and cheese factories.

The inspection of factories is carried on from May to November of each year and so has enabled the province to make great strides forwards during the last ten years, as the following statement will show.

In 1916 the various grades of cheese were in the following proportion: No. 1, 46.476 per cent; No. 2, 48.232 per cent; No. 3, 10.299 per cent. In 1919, the proportions were as follows: No. 1, 75.32 per cent; No. 2, 22.32 per cent; No. 3, 1.35 per cent.

As to our butter, its reputation has been established for a long time. The superior quality of our butter is recognized, not only at the Toronto exhibition and other exhibitions, but on all the principal markets. In 1918 the proportion of No. 1 butter was 94.48 per cent.

These results are due to the competence of the makers and to the good condition in which are the majority of the factories. In 1915 cement floors were found in 790 factories and the drainage system was good in 983 factories. In 1917 there were 1,139 cement floors and 1,372 good systems of drainage, which is an increase of 349 and of 389 respectively in two years. In 1915 there were, according to the statistics, 376 cheese-curing rooms built according to our plans. In 1917 the number was 541, or an increase of 165.

Cow testing has made wonderful progress during the last few years, on account of the joint action of the Dominion and Provincial Departments of Agriculture. All our inspectors of butter and cheese factories as well as all our district agriculturists have lent assistance. Over two-thirds the number of cows under test in the whole of Canada are now found in the province of Quebec.

All our makers receive their training at our provincial dairy school. They must now have a diploma of this institution.

The payment of milk by fat will become compulsory on the 1st of January, 1924, under an Act passed last year.

The total expenditure in 1920-21, on account of the development of the dairy industry, was \$150,000, \$5,000 of which was taken from the Dominion grant.

District Agriculturists

The first five official agriculturists were appointed in October, 1913, the first year during which a subsidy was granted by the Dominion Government. The following year a total of \$10,000 was set aside for their salaries and expenses.

This system of agriculturists has grown very rapidly since it was inaugurated. In nine years' time practically all counties of the province were provided with agriculturists.

The growth of this system is shown in the following table:—

THE AGRICULTURAL GAZETTE OF CANADA

Year	Number of agriculturists	Assistant agriculturists	Number of counties
October, 1913..	5	..	10
July, 1914..	5	1	10
" 1915..	6	2	11
" 1916..	9	2	16
" 1917..	14	10	27
" 1918..	20	20	37
" 1919..	34	30	37
" 1920..	40	32	43
" 1921..	49	19	51
February, 1922..	55	16	55

The following figures give some idea of the work performed by agriculturists during the last fiscal year, i.e., from July 1, 1920, to June 30, 1921. During this period, 2,501 lectures and 4,179 demonstrations were given; 273 field demonstrations, 253 school gardens, 25,206 home gardens, 107 school fairs, 56 vegetable competitions, 38 stable competitions were organized and supervised; 38,613 visits were paid; 16,836 visitors were received; 48,093 letters were written and 20,688 publications were distributed.

Special attention was given to sheep raising and 629 demonstrations on dipping were held during which 29,405 sheep were dipped. This dipping has given excellent results and caused great improvement in the quality of the wool marketed.

The work of the agriculturists includes the whole of the agricultural field, the organization and supervision of agricultural associations, farmers' clubs, etc., of demonstration fields and competitions of all kinds.

All agriculturists performed extremely useful work during the war; they were the main factor in the campaign of greater production in all counties and parishes. They were also the chief organizers of the 842 rural committees that operated in 1918, and the increase of 700 per cent in the production of wheat, of 40 per cent in that of hogs, of 100 per cent in peas and beans and of over 800,000 acres in field crops during a single year is partly due to the work of the agriculturists, which already covered a considerable part of the province.

In 1917, a beginning was made in supplying motor cars to the agricultur-

ists. A first trial was made with four machines. To-day all agriculturists, with the exception of two, use motor cars. At first, these cars belonged jointly to the Department and to the agriculturists. It was believed that this system would insure taking greater care of the machines. There were some objections, however, and the Department now owns all these machines. The motor cars give entire satisfaction if the car used is light and comparatively cheap. It enables the agriculturists to do more work and it does not cost so much as horses.

The first secretaries to agriculturists were engaged in 1918 and their number increased with the growth of this system. There are now twenty such secretaries, stationed in most extensive and best organized districts. Each agriculturist's office costs from \$2,000 to \$4,000 per year.

Few districts are now vacant and in a year or two every county in the province will have an agricultural information office. Counties desiring to have the benefit of an agriculturist must grant at least \$250 which amount is added to the yearly salary of the agriculturist. In 1921, three counties granted from \$600 to \$900; seven counties, \$500; nine, \$400; the others varying from \$250 to \$400.

A total of \$187,000 was spent by the Department in 1920-21 for the maintenance of this service, of which \$69,000 was taken from the Dominion subsidy.

Bee-keeping

Apiaries have been inspected in the province of Quebec since 1908, but it

was only in 1918 that a regular bee-keeping division was organized and that bee-keeping made real progress.

In 1913 there were only six inspectors of apiaries; there are now 20. Their work consists in spreading a knowledge of bee-keeping, encouraging the people to take up the industry, making demonstrations and combating foul brood disease.

A number of experiments on wintering bees have been conducted and seventeen wintering cases were distributed by the Department. These have now been used for four years and appear to demonstrate that wintering bees outdoors is practicable in the greater part of the province of Quebec.

Since 1918 short courses have been held each year in the chief centres of the province. These have created much interest in bee-keeping and many small apiaries have been started as a result of this work. Five bee-keeping associations are subsidized by the Department.

The bee-keeping division costs every year \$27,000, of which \$7,000 is paid under the Agricultural Instruction Act.

Tile-draining

The grant which has been distributed with the object of encouraging the reclaiming and particularly the under-draining of lands has enabled us to establish a tile-draining division.

The officials in charge of this work have, for the last few years, prepared and distributed, free of any charge, many plans for drainage at the request of farmers. They have, in addition, supervised important work in connection with the reclaiming of farms. Several demonstrations with ditch digging machines have been given. In a number of cases tile draining should be preceded by better superficial draining of water, through open ditches. In order to facilitate this work the engineers of the Department have made at the request of

many parties, hundreds of inspections, specifications and estimates in connection with this work.

Maple Sugar Industry

Three sugar-making schools were inaugurated in 1914. They received that year seventeen pupils and 1,573 visitors. A fourth school was opened in 1916 and the four establishments received altogether 42 pupils and 2,459 visitors. Only one school has been in operation since 1920.

In 1916, with a view to reaching as many sugar-makers as possible, it was thought that instructors visiting maple groves and spending a day making sugar or syrup in each of them would do more good than sugar-making schools. Many demonstrations have been given since then to teach the best methods of making. In 1921, 102 demonstrations on the spot were given by seven instructors in 29 counties, with a total attendance of 5,584 persons, most of whom were makers or persons interested in the making of maple sugar and syrup.

Some experiments have been carried on at the sugar-making school of Ste. Louise, the only one that is now in operation, in order to determine the proportion of sugar, the quality and the thickness of the sap, taking into account the depth, the size and the height of the hole on the tree.

Two special exhibitions of maple products were held in Quebec in 1918 and 1920 and were very successful.

Short Courses

This teaching is given by means of short courses of one week at each place. These courses are held during four or five months each year for agricultural purposes, but the domestic science courses, for farmers' wives, are held during ten months.

The agricultural short courses deal with the following problems: rural economy, rotations, soil, fertilizers,

THE AGRICULTURAL GAZETTE OF CANADA

amendments, drainage, ploughing, prairies and pastures, the growing of cereals and field roots, the control of weeds and diseases; dairying, cow testing, raising of calves, colts, swine and sheep; the feeding and lodging of cattle; raising of butcher cattle, the production of wool, poultry keeping, bee keeping, gardening, horticulture; the production and making of maple sugar and syrup; agricultural fairs, colonization, farm machinery and problems of rural sociology.

Domestic science courses are given to 60 farmers' wives' clubs, housekeepers' clubs and the women in general. They include house and food hygiene, the administration and decoration of the house, the domestic textile industry of wool and flax; cooking, sewing, mending; care of the children, home nursery

and care of the old; horticulture, floriculture, canning, bee-keeping, poultry-keeping, and social problems.

Between 1912 and 1922, with a small increase in the teaching staff, the work has been increased five times and our methods of class-room teaching and practical teaching have been improved. The full outfit of demonstration, miniature models, tables, specimens, moving pictures and lantern slides, lend greater attraction to the lectures of our experts. Most of our teachers are graduates of the agricultural colleges and higher domestic science schools.

The following table gives a summary of the work accomplished during the last nine years in the province of Quebec, by travelling courses of agriculture and domestic science:—

Years	Places visited	Teaching staff	Lectures given	Demonstrations	Attendance
1912.. . . .	19	12	244	101	12,700
1913.. . . .	62	18	237	24	28,201
1914.. . . .	59	20	205	57	25,721
1915.. . . .	11	17	374	24	18,800
1916.. . . .	19	18	612	34	48,198
1917.. . . .	34	22	665	80	40,376
1918.. . . .	39	21	594	94	30,550
1919.. . . .	42	23	598	125	52,397
1920.. . . .	64	22	817	196	56,358
1921.. . . .	121	26	1,232	299	80,994
Total.. . . .	470	199	5,578	1,034	394,295

MACDONALD COLLEGE

School of Agriculture

Animal Husbandry.—The appropriation to this department has been devoted to three main purposes. One assistant in the department has been maintained. His work until recently has been largely extension work in connection with sheep and the expenses incidental to such work have been charged to the federal grant. The first year the appropriation was received, three demonstration flocks of Cheviot sheep—ten to a flock—were imported from Scotland and established in the province. In 1915, these were sup-

plemented with six flocks more. When the Cheviots were introduced they were almost unknown in the province. From the originals twenty-five flocks have been established, mostly in sections of the province where sheep were in great need of improvement. Some of these flocks have grown to fifty head and from them many rams have been distributed to grade flocks, and selections from them have been sent to practically every province in the Dominion, experimental farms in five of the provinces receiving rams from them. Largely because of

this Cheviot work in Quebec, registrations of pure bred Cheviots have grown from five in the first flock book to well over a thousand at the present time.

Cereal Husbandry.—The funds provided have been devoted to investigation, and to the extension of a number of the results obtained by the department's work. The grant has made possible a complete series of investigations on the cultural requirements of root crops, their improvement by selection and crossing, and the growing of root seed. Definite data have been obtained as to the best cultural practices to be followed in Quebec. Decided improvement has been effected in yield of dry matter per acre, uniformity and keeping quality. It has been clearly demonstrated that home grown root seed is superior to that usually found on the market and forms the most reliable source of supply.

Since 1919, the funds have been devoted largely to the extension of the results obtained by this department through selection and breeding. Alaska oats have been found most suitable to certain sections of the province and their more general use in those areas has been encouraged. Similarly, another variety of oats is being tested as to its adaptability to local conditions with a view to its wide dissemination. North-western Dent Corn and Quebec 28 have been multiplied and disseminated widely.

Alfalfa and Fall Rye, as the result of numerous local tests, have shown their suitability for certain conditions in the province and their use has been encouraged.

Chemistry.—The investigation of maple sap products was undertaken under the provisions of the Agricultural Instruction Act, and is reported in *The Agricultural Gazette of Canada*, January-February, 1922, No. 1, Vol. IX.

Entomology and Zoology.—In this department a lecturer is employed under The Agricultural Instruction Act. His teaching duties take up most of his time

during the college session, but in the summer he devotes himself largely to entomological investigations.

A brief resume of the department's activities during the period under consideration follows.

1. The life history of *Phyllotreta zimmermanni*. This insect was first recorded for Canada in 1913 as a pest of turnips and other cole crops. In the adult stage it resembles closely in appearance and habits the striped turnip flea-beetle (*P. vittata*), but it passes its larval stage as a miner in the leaves of pepper grass.

2. The Bud moth (*Tmetocera ocellana*). Considerable attention was given to this insect which is a serious pest of apples in Quebec. Its life history, habits, food plants and parasites were studied and three seasons were spent in experiments on its control. The more important results of this study were published in 1917 in the report of the Quebec Society for the Protection of Plants.

3. Studies on *Coccobacillus acridorum*. At the request of the Dominion entomologist, and in collaboration with the bacteriological department of the college, investigations were undertaken to determine the practicability of using this bacterial disease in controlling locusts in Canada. The disease was studied thoroughly in the laboratory and in the field, as were also those habits of the locusts which brought them into relation with the disease. It was found impracticable to use this method of control in Canada, largely owing to the presence of an extensive indigenous intestinal flora of related organisms which immunized the locusts against the disease.

4. Report on *Tychius picirostris*.—This European insect was discovered injuring clover in 1915. It has been kept under observation since that year. In 1916 there was a slight increase in its activities but there has been no marked injury since.

5. Research in progress—(a) Studies on soil protozoa. (b) Relation of cer-

tain sucking insects to the transmission of plant diseases. (c) Life history of a haemosporidian of ducks. (d) Morphology and development of *Ornithodoros moubata*.

6. The preceding account deals with investigational work. In addition to this, advice is given freely on the control of insect pests; to this end many visits have been made to fields, orchards and gardens. Last year, in collaboration with the horticultural department, demonstrations were given on the control of root maggots in truck gardens in the vicinity of Montreal.

7. *Papers published*.—The Wavy-striped flea-beetle.—Can. Ent. XLVI., p. 433, 1914. On the nervous system of *Sphida Obliqua* Walker.—Trans. Roy. Soc. Can. VIII., 225, 1914. Some insect parasites of the bud moth.—Seventh Rept. Que. Soc. Prot. Plants, 1915. Two bacterial diseases of injurious insect larvae.—Seventh Rept. Que. Soc. Prot. Plants, 1915. The occurrence of *Tychius picirostris* on clover at Ste. Anne's, Que.—46th Rept. Ent. Soc. Ont., 1916. Death-feigning reactions in *Tychius picirostris*.—Journ. Animal Behaviour VI., 1916. Experiments on the control of locusts with *Coccobacillus acridiorum* d'Herelle (with J. Vanderleck).—47th Rept. Ent. Soc. Ont., 1917. Studies on *Coccobacillus acridiorum* d'Herelle and on certain intestinal organisms of locusts (with J. Vanderleck). Ann. Ent. Soc. Am. X., 1917. The eye-spotted bud moth.—Ninth Rept. Que. Soc. Prot. Plants, 1917. On the structure and function of the proventriculus of *Gryllus pennsylvanicus*. Burm. Psyche XXV., 1918. The propleura and pronotal grilci of the orthoptera. Can. Ent. LI., 1919. On the muscular system of *Gryllus assimilis* Fab. Ann. Ent. Soc. Am. XIII., 1920. Studies on *Spirochaeta duttoni* in the tissues of its invertebrate host.—Ann. Trop. Med. & Hyg. Liverpool (to appear shortly). Reports and popular papers on injurious and beneficial insects, published in Repts. of Ent. Soc. Ont., Que. Soc. Prot. Plants, etc.

Horticulture. School Fair Work.—Distribution of potato, beet, carrot, bean, corn, tomato, and flower seeds to children in rural schools. Liberal packets or quantities of seed, sufficient to plant a plot of each were distributed to from 1,000 to 5,000 each year or until the work was discontinued two years ago.

Rural schools to the number of twenty have been provided with trees, shrubs, vines and perennials with a view to improving the school surroundings. One academy and several rural churches have been similarly provided with plants.

Three small demonstration orchards of fifty trees each were planted and of these two have done well.

A Skinner irrigation system of seven acres was installed for strawberries and vegetables. It has demonstrated its value under our climatic conditions on such crops as strawberries, celery, onions, early vegetables, etc. In some years irrigation applied in a period of a drouth has more than doubled the crop over non-irrigated plots. Irrigation has also demonstrated its value at transplanting time in giving plants a quick start and eliminating losses from drouth, etc. Applications of from one-half inch to one inch are usually given, depending on the crop. Three to six applications for the season are usually sufficient for most crops but in the case of melons, etc., more frequent applications are necessary.

A variety and strain test of onions and cabbage was carried on and completed. It has shown that much seed sent out was not true to variety or strain, was low in germination, and in other ways was of little value as compared to the best strains available. Probably the greatest improvement in crop yields could be brought about by the elimination of much of the worthless or inferior seed now on the market.

Field-spraying experiments on Fameuse apple orchards were carried on for several years.

Field experiments and demonstrations in the control of onion and cabbage maggots and onion smut.

Encouragement given in the cultivation of small fruits and vegetables, particularly among the returned soldiers who have settled on the land. Seeds, cuttings and plants have been distributed as nuclei. Small fruit plants were also sent to the Boys' Farm and Training School, Shawbridge, P.Q.

Collections of peonies and irises were obtained for the college campus.

Lectures, short courses and demonstrations have been arranged for at various points in the province, and judges provided for exhibitions and horticultural societies.

Equipment has been added to, particularly in lantern slides, and in spraying and dusting machinery.

Poultry. Since poultry raising is just as sound a business as any other branch of farming, and since the need for increased production of eggs and poultry meat is very great indeed, the efforts of this department have been concerned chiefly in the development of an efficient extension policy. The aim has been to make this department of the greatest possible service to poultry raisers. Several lines of extension work have been carried on, involving the employment of an extension poultry husbandman, chief among which are the following:—

The poultry department has worked through the rural schools to improve poultry raising conditions by encouraging the children to take an active interest in the work on the farms and at the same time giving the children an opportunity of doing some practical work in poultry production. From 1913 to 1920 inclusive the following numbers of settings of eggs from bred-to-lay strains were distributed free of charge: 100, 425, 610, 541, 658, 892, 740 and 750, making a total of 4,716 settings. Several hundred settings were also sold to the Quebec Department of Agriculture for distribution.

From 1913 to 1921 inclusive the following numbers of school fairs have been held:—3, 9, 14, 13, 21, 24, 25 and 32,

making a total of 141 fairs, for which judges were supplied free of charge for much of the judging work.

Fifteen demonstration flocks were selected as a source of supply for eggs for school fairs and as community breeding centres in the distribution of eggs from improved flocks in their various localities. These flocks have been used for breeding purposes pedigree bred-to-lay males from this department. An inspection and culling of the flocks was made twice yearly.

Six demonstration houses were erected in 1913 in various parts of the province. Using these houses as models, a large number of houses have been built by farmers.

The amount of information and literature on poultry raising sent out has steadily increased.

Demonstrations and lectures have been given at meetings of poultry associations, women's institutes and farmers' clubs.

More recently special demonstrations have been given in fattening and preparing poultry for market. Birds have been fattened, killed, plucked and dressed under direct supervision and the supervisor has assisted in enabling many farmers to market their produce more efficiently.

With a view to conducting local culling schools in different parts of the province, demonstrations have been given in selecting layers and breeders. Assistance has also been rendered in marketing the culled stock.

Rural Schools. This department was organized in the spring of 1915. Its mission was to study rural conditions in the Province of Quebec, especially as they related to the boys and girls, and to follow up lines of work which would be of great value to the various communities.

At one time the appropriation of the department allowed the engagement of two men and provided for a fair amount of travel but now it is sufficient to support only one. However, it is consid-

ered, very decidedly, that the department has been able to help the people, especially the children, in the province, and that it has supplied and will supply, in part, a widespread want.

The summer months of 1915 were spent in a study of work done in the province of Ontario in connection with the enlargement and beautification of schools and school grounds, courses in agriculture, school garden projects and school fairs. In the fall some assistance was given the Macdonald College demonstrators with their school fairs. During the winter months a very extensive tour of lectures in agriculture was carried through in the intermediate and high schools in Quebec province. In the spring the grounds of several schools were improved with the planting of shrubbery and perennials.

In the spring of 1916 the Macdonald College demonstrators were withdrawn. From 1916 until 1921, the rural school department was, in reality, a special department for the organization and execution of school fair work among the English-speaking children of the province. The great value of that work was recognized and an effort was made to have it efficiently managed. As an evidence of its popularity, in 1918, almost 8,000 children received seeds and eggs and had the right to exhibit at some school fair.

In the fall of 1919, the Quebec Government, at its expressed desire, became responsible for the management of school fair work in all counties where it had agricultural representatives. Because of this, Macdonald College confined its efforts for the year 1920-21 to approximately 2,000 children and endeavoured to show still more clearly the wonderful possibilities in this work which seemed to be satisfying, in some measure, the hunger of the young people. During this year a large amount of time was spent in giving demonstrations and lectures in household science and agriculture to all the children interested in the

work. It was and is felt that this is a most necessary phase of the work if the children's efforts are to result in their rising above the level of the individual home. In September, 1920, nine extremely successful school fairs were held.

The purpose of the school fairs is to stem the flow of young people from the country. There are many sides to the needs of the people in the rural districts which are not agricultural and which a department of agriculture could not very well supply. What the people are hungering for is a true social life where their higher, aesthetic longings will be satisfied. All these lines of work could be embraced in the school fair programme, but much more sensibly under the auspices of a department of education than a department of agriculture. The people want music, supplied by themselves; they want a knowledge of individual and group athletic competitions; they want to be joined as units of the nation by means of the establishment of community centres; then, when they have these wants supplied they will lend a more attentive ear to the advice of our purely agricultural experts. Because of these findings the Macdonald College authorities advocated, during 1921, a change in the management of the school fair work in this province. They would like to see the work directed and executed by the two committees of the Department of Public Instruction.

During 1921 considerable time was spent in an effort to have the above-mentioned change in management of this work go into effect, but the effort was not successful due to scarcity of funds. The remainder of the year was used to experiment with several lines of community work to see how they would be received.

Veterinary Science. Instruction.—Instruction and practical work were given to the first, second and fourth-year classes in the school of agriculture. To the first-year students, a general introduction to the subject, principal

structures and functions of the animal body; to the second-year, a more advanced and practical course to familiarize the students with the common ailments of farm animals and the most modern methods of preventing same; to the fourth-year students, a special and more elaborate course was given so that they might become critical judges of live stock with regard to disease and develop sound judgment in handling sick animals; to the fourth-year, a course in contagious and infectious diseases, supplemented by two laboratory periods per week, covering a bacteriological study of organisms causing certain specific diseases and post-mortem examination of animals which have died of such diseases. To returned soldiers, under the Invalided Soldiers' Commission, and under the Department of Soldier Civil Re-establishment, was given, at Macdonald College, a simple practical course dealing with the common veterinary practice on the average farm.

Much work has been done and is being done in combating and controlling infectious and contagious diseases, as follows:—

Abortion, (a) advising owners as to care of cattle which have aborted; (b) treatment of sterile animals with success.

A treatment was devised for "calf diphtheria." This disease is found very frequently in the locality of Macdonald College and is attended by losses due to the stunting of growth of the individuals affected.

A severe outbreak of calf septicemia was also combated for a farmer in the eastern townships.

Lip and leg ulceration also made its appearance in this locality and was successfully dealt with.

Avian diphtheria was diagnosed and controlled in a large flock of poultry.

At the present we are investigating a disease which has caused the loss of numerous cows and calves on a farm in the eastern townships. We have been

able to discover the organisms causing the disease and the source of the infection. It remains that we should work out the details of the disease and a treatment for the same.

Extension.—Extension lectures were given in various parts of the province, under the auspices of farmers' clubs and breeders' associations, dealing particularly with tuberculosis, abortion, garget, etc.; inquiries were answered by mail, etc.

Research.—Assistance was rendered in connection with the bacteriological investigation of the milk supply of the city of Montreal, reported on in September, 1914.

Publications.—Articles in the *Journal of Agriculture and Horticulture of the Province of Quebec*:

A combined neurectomy hook and knife, *Vet. Journal*, London, September, 1918. A method of enucleating the eye, *Vet. Journal*, London, January, 1919. Pump attachment for record syringes, *Vet. Journal*, London, August, 1919. Surgical narcosis of horses by chloral hydrate given intravenously, *Vet. Journal*, London, November, 1919. Periodic Ophthalmia—A review, *Can. Vet. Record*, Toronto, April, 1920. Case Report—Malignant cedema in an aged mare, *Cornell Veterinarian*, Ithaca, October, 1920, *Can. Vet. Record*, Toronto, November, 1920. Case Report—Traumatic Pericarditis in a heifer, *Cornell Veterinarian*, Ithaca, July, 1921; *Can. Vet. Record*, Toronto, March, 1921. Anaesthesia in general practice (an address), *Sci. Agri.*, Gardenvale, April, 1921.

School of Household Science

Work under the Agricultural Instruction Act was definitely undertaken in October, 1913. At this time a member was added to the staff of the school who should devote her whole time to extension work among the women in the rural districts of the province.

Prior to this date the women of several rural centres, with the assistance of members of the school staff, had organized eight clubs with aims and objects similar to those of the present women's institutes. During the first few months, through demonstrations and meetings held, interest grew to such an extent that in February, 1914, a conference of representative women was held at Macdonald College, a constitution drawn up, and the organization known as "Home-makers' Clubs," definitely launched. In 1919, this organization joined the federal organization, and changed the name to Quebec Women's Institutes.

A survey of the activities of the extension department shows that the growth of the work required the appointment of an assistant demonstrator in September, 1916. Work among the children of the rural schools developed in connection with the school fair movement, and, in November, 1918, a second demonstrator was appointed. Later the school fairs were largely taken over by the provincial government, and since July, 1921, the staff has consisted of only two permanent members. A Victorian Order Nurse, loaned by the Order during the autumn of 1921, lectured and demonstrated on home nursing, care of children, etc.

During the years from 1913 to January 1922, seventy-four Institutes have been organized in localities ranging from Megantic on the east to Pontiac on the west—the latter county having thirteen active clubs. The membership in June, 1921, was 1321, and, in January, 1922, the number of active organizations is sixty-two—shifting population in scattered centres being chiefly responsible for the few disbanded. The territorial extent of the province necessitates extensive travelling, and organizations now planned for Montmorency and Gaspé will add greatly to the area to be covered.

That the organization of rural women was an important movement is evidenced in their activities. These dealt primarily

with the home, but have broadened out to embrace the school, the community and the State. Courses of study were planned by their director dealing with such subjects as cookery, sewing, laundry, household accounts, civics, economics, etc. Interest in school lunches and the feeding of children led to the placing of a school lunch equipment in many schools. Supplying milk, drinking fountains, musical instruments, shrubbery, prizes for competitions, and the improvement of grounds, are other benefits to schools. The care of cemeteries, assistance to hospitals, libraries and charitable institutions, providing healthful amusement for young people, and aid to, or the building of community halls are other common lines of work. Any worthy community object receives the support of the institutes. During the war, they were able to turn their attention to its needs, being already organized, and having received instruction in foods through the demonstrations and courses of study. To-day their interest in child welfare and better citizenship gives excellent promise for the future.

Each year, in June, a two-day convention of delegates is held at Macdonald College, when demonstrations and lectures are given, reports read and discussions held on matters of policy, and the problems of institute work. Seven such conventions have been held with an average attendance of sixty-seven. The College provides accommodation and the extension department defrays expenses of board, printing, speakers, etc.

From October, 1913, to January, 1922, the number of demonstrations in cookery, sewing, home nursing, etc., given to institutes, totalled 496. Demonstrations in cookery and sewing to pupils of rural schools 1916-1921—442; school fairs judged at during the same period, 104—the total number of judges supplied being 188.

Four travelling libraries of 35 volumes each were established in 1914 and

supplied free to institutes. These are in constant circulation.

A clipping library is maintained at the school for the institute members. It consists of 728 folders, and is in constant use.

Bulletins have been prepared and supplied as follows:—

Canning of Fruits and Vegetables, 5,500 copies; *Cookery*, 2,500 copies; *Sewing for Children*, 2,000 copies; *Saving of Meat and Wheat*, distributed during the war, and no record kept. In addition, 1950 commercial patterns have been supplied for sewing competitions.

Staff members have assisted with demonstrations and addresses at short courses held at Macdonald College and at other centres, meetings of farmers' clubs, housewives' leagues and other women's organizations. They have also carried on experimental work in cookery in preparation for bulletins, and given lessons and demonstrations to boy scouts, written articles on topics related to institute work for the *Journal of Agriculture and Horticulture of the Province of Quebec* and other publications.

Short Courses in Agriculture

During the first eight years (the ninth registration year not being as yet complete) that the Agricultural Instruction Act has been in force, all the short courses in agriculture held at Macdonald College and throughout the province have been financed under this Act. There has been a total of 410 students who have attended such courses held at Macdonald College, and an estimated attendance of 367 at the short course in Suburban Gardening, extending over four evenings, held at McGill University, Montreal, during the session of 1916-17. In the session of 1915-16, one-day short courses were held in live stock, field crops, poultry, horticulture, farm engineering and farm home at nineteen different centres of the farming community of the province. In all 52 meetings were held in 19 places, in 11 counties. Total attendance 2,371. Average attendance per meeting, 46. Thirty-six meetings were for men; total attendance, 1,740; average per meeting, 48. Sixteen were for women; total attendance, 631; average per meeting, 39.

SUMMER-FALLOW SUBSTITUTES

GROWING GRAIN IN ROWS

BY MANLEY CHAMPLIN, M.S., SR. PROFESSOR OF FIELD HUSBANDRY, UNIVERSITY OF SASKATCHEWAN

THE development of Saskatchewan has been based upon the production of wheat and oats. In order to conserve moisture and destroy weeds it has been the custom to summer-fallow once in two, three or four years, varying according to local soil and climatic conditions. This practice has usually proved profitable in the various districts as long as land was cheap and retained enough of its original fibre to prevent it from drifting, providing that the market prices of wheat and other grains were relatively high.

At the present time certain factors are operating to force a change in this scheme of operating a prairie farm. Just which of these is entitled to be called chief would be difficult to say, but each one exerts its influence towards a change. In many districts trouble is now experienced with soil drifting. The fallow lands are exposed to weathering for nearly a twelve month with the resulting movement of soil. The effects of drifting soil are so self evident that it is not necessary here to dwell upon them.

Market values of grain crops are no longer sustained by war inflation and it is necessary to cast about for methods by which to produce cheaply in order to compete in world markets.

Land values in some districts have advanced to a point where the interest and tax charges against a fallow acre for a year have become a real hardship to carry, often destroying all hope of profit in wheat production, or creating an actual loss to the grower.

Letter after letter and caller after caller coming to the Saskatchewan University Field Husbandry Department make statements which reduced to their

rows that can be used as a substitute for part of the fallow will be welcomed at this period in our agricultural history. Some are trying corn and others potatoes. These crops serve the purpose for a very limited acreage; but since corn is only dependable as a forage crop and potatoes do not find a ready market in large quantities at profitable prices, it remains for us to find something else that can be grown on a large acreage to replace a material percentage of the present summer fallow.

This leaves us the natural crops to which the province is best adapted; wheat, oats, barley and spring rye. Of



Summer Fallow Substitutes—Oats in Three-row Groups: Saskatchewan College of Agriculture.

briefest form can be summed up in the words, "*We must change our method of farming or give up.*" Most of them are not expecting to give up but are planning to work in certain adjustments or changes that will tend to insure the farm income and lower the cost of production of the chief market product, wheat.

Possible Fallow Substitutes

With this introduction it will be plain to all that any crops grown in cultivated

these four, oats has certain advantages as a cultivated crop. It is the chief feed grain crop and is used in large quantities as a hay crop, usually spoken of as "green sheaf feed." Therefore, if cultivation retards ripening or causes uneven maturity, the oats may be cut for sheaf feed without any considerable loss.

In order to grow grain crops in rows it is necessary to devise a special method of seeding but it is not necessary to buy a new seeder. The only new implement

required is a corn cultivator, and if one possesses a garden or one horse cultivator he can get along with that the first year or two while he is trying the practice on a small acreage.

How the Idea Originated

The idea of growing grain crops in rows and cultivating them originated during the season of 1911 while we were employed as cerealist at the Highmore experiment farm in South Dakota. During that year hot winds were so severe and continued over so long a period that all of the ordinary grain crops were destroyed. Our grain breeding nursery which was grown in rows 18 inches apart and kept cultivated to keep out the weeds was the only grain which headed out in that district. Gophers came in from the surrounding prairie in great numbers in search of green feed, and it was with the utmost difficulty that we were able to save any of our grain breeding nursery from their ravages. From this, some idea can be formed of the severity of the drouth and blistering hot winds which accompanied it.

A Russian agricultural commissioner by the name of Kol, who was then traveling in the United States, visited Highmore farm one day while we were engaged in cultivating a part of the grain nursery with a wheeled hoe or hand cultivator. When he noticed that the nursery grain was headed out and all the other grain crops were ruined, he asked why we didn't plant all of our grain that way. We told him that the cost of labour would absolutely prohibit that. He stated that much grain was grown in his home province by planting in rows far enough apart so that the women could walk between and hoe out the weeds.

We had long realized that in order to grow grain crops successfully in the central and western South Dakota, it was necessary to sow them on land that had been summer fallowed or which had produced an intertilled crop the year before.

Grain sown on corn ground which had been properly cultivated produced somewhat better than grain sown on summer fallow and rarely failed to produce a satisfactory crop while grains sown repeatedly by the ordinary method on the same land could be depended upon to fail three years out of five. At that time many farmers grew corn as a fallow substitute but very few grew enough corn to equal or balance their grain crops. This was particularly true in the northern half of the state. Some other fallow substitute seemed necessary. If the Russian method with grain crops could be adapted to machine culture, the problem would be well on toward solution. Single rows far enough apart for horse cultivation did not seem feasible so we tried double rows and triple rows spaced 36 and 30 inches apart respectively.

South Dakota Experience

All of the ordinary spring sown grain crops were given a trial for from five to seven years. The net result of these trials was that we found that all of the spring grain crops except flax responded nicely to cultivation. Oats and barley were especially good and wheat was satisfactory. Millet, proso and Sudan grass also were tried and found suitable for this method of culture. Thus our list of cultivated crops which formerly consisted of potatoes, corn and sorghum and garden stuff was expanded to include oats, barley, wheat, millet, emmer, proso and Sudan grass.

The effect of the cultivation of the grain or other crop in rows upon the succeeding crop was observed for seven years and no material difference could be noted; for example, between the wheat on corn ground, summer-fallow, potatoes or oats grown in rows. Owing to lack of available land and funds for investigation work it was impossible to lay out a new project in which a direct and absolute comparison of this kind could be made. We were therefore obliged to put in the row grain crops in connection

with our crop rotation project, and while we had ample opportunity for observation in a fairly accurate way, we had little opportunity to make strictly scientific comparisons of resulting yields of wheat or other grains following the various substitutes.

The detailed results of these investigations have never been published by the South Dakota Agricultural Experiment Station except in the case of Sudan grass and barley.* Under the rules of that station no results of experiments can be obtained for publication until after they have first been printed in an official bulletin. Hence we are unable to quote here actual results for wheat, oats, emmer, proso, and millet. The results with barley, however, are quite representative of those obtained with other grain crops. The tests at Highmore covered a period of five years, 1912 to 1917. The average yields were as follows:—

Ordinary drills, 6 inches apart.. . . .	24.4
Drills 12 inches apart.. . . .	22.5
Double rows—cultivated 36 inches apart.. . . .	19.6
Triple rows—cultivated 30 inches apart.. . . .	23.1

The grain was usually plumper and the quality better from the rows than from ordinary seeding, and the stubble of the row grain left the ground in such nice shape that discing and harrowing was sufficient preparation for the following crop, whereas the ordinary stubble had to be ploughed. The drill was set to sow at the same rate per acre in each case, namely, 1.5 bushels, but this reduced to 0.75 bushels for the 12-inch rows, 0.43 bushels for the double rows 36 inches apart and 0.64 bushels for the triple rows 30 inches apart.

Thus we were saving more than half on seed grain, were preparing the land better for the next crop, were producing

a better quality of grain and very nearly the same average yield by seeding in rows. In the seasons when moisture conditions were favourable the ordinary seeding yielded the best. In the dry seasons the rows yielded the best.

Sudan grass results are reported for two years, 1915-16, from five methods of seeding as follows in tons per acre:—

Drill rows 6 inches apart	2.84
Drill rows 12 inches	2.63
Drill rows 36 inches	2.14
Drill rows 42 inches	1.99
Double drill rows 36 inches	2.12

The rainfall was sufficient in both years of this test. The drill was set to sow half a bushel (25 pounds) per acre for the ordinary seeding and was left at the same set for seeding the rows, thus requiring 12.5 pounds per acre for the 12-inch drills, 4.1 pounds for the 36-inch drills, 3.6 pounds for the 42-inch single drills and 7.2 pounds for the 42-inch double drills.

The yield and quality of hay was better from the ordinary seeding than from the rows, but the land was left by the row plantings in a condition comparable to fallow. Sudan grass is a good annual forage crop for late spring seeding and the results given may be taken as quite representative of results obtained from millet and proso.

In the year 1915 we grew Kubanka wheat which gave the same yield per acre, namely 15 bushels, in triple rows 30 inches apart as was produced from ordinary seeding on a 50-acre field divided evenly.

Experiments at the University of Saskatchewan

With the experience quoted above to guide us, we determined to conduct experiments at Saskatoon to learn whether

*Champlin and Winright, S. D. Bul. 174, Sorghum for Forage in South Dakota, pp. 435-636.

Champlin, Morrison and Martin, S. D. Bul. 183, Barley Culture in South Dakota, pp. 65-67.

the practice of growing grain in rows as a fallow substitute would prove feasible here.

Preliminary experiments were instituted in 1921. The plots used were fairly large, 0.4 acre each. Very encouraging results were obtained. Wheat, oats and barley were included in the tests. Each crop was sown in two-row groups 36 inches apart and in three-row groups 30 inches apart. For comparison, yields are included for the same varieties sown in the usual way, as first and second crop after summer-fallow. The row grains were sown on land that had grown oats the previous year, 1920, and various crops in 1919 not having been fallowed since 1918.

The yields of grain in bushels per acre and straw in pounds per acre were as follows:—

MARQUIS WHEAT

Method of Seeding—	Grain	Straw
Ordinary, on fallow	37.0	3,640
Ordinary, on fall ploughing	37.0	3,260
Double rows, 36 inches apart	18.5	953
Triple rows, 30 inches apart	22.1	1,115

BANNER OATS

Ordinary, on fallow	83.5	5,220
Ordinary, on fall ploughing	60.0	2,720
Double rows, 36 inches apart	59.6	755
Triple rows, 30 inches apart	63.9	953

HANNCHEN BARLEY

Ordinary, on fallow	59.2	3,220
Ordinary, on fall ploughing	56.5	2,460
Double rows, 36 inches apart	39.2	565
Triple rows, 30 inches apart	49.4	728

In 1922 Marquis wheat will be planted over all of this land and a plot of summer-fallow adjoining in order to secure a direct comparison of the effect of the grain crops in rows and summer-fallow upon the yield of wheat.

In addition to the experiment above noted, the Animal Husbandry department sowed oats in rows as a summer-fallow pasture crop with quite satisfactory results in 1921.

Further Investigation Essential

As will be seen from the foregoing, the preliminary trials with row grain have been encouraging, but further investigation is required to make certain of the chief points which remain doubtful, as follows:—

1. How will the yield of wheat after grain in rows compare with the yield of wheat on fallow or on corn ground?
2. Will the return from the grain in rows repay one for the extra labour required as an average for several years?
3. Will any difficulties such as slow maturing, lodging or rusting be found to be greater in producing grain in rows than in growing grain by the usual methods?
4. Will the stubble standing through the winter and the roots remaining in the soil in the spring help check soil drifting?
5. Will weeds in the rows give trouble on the average farm?

This year at the University of Saskatchewan a project will be undertaken to determine the effect of various fallow substitutes in the production of wheat outlined as follows:—

Oats in double rows	36 inches apart
Oats in triple rows	30 inches apart
Barley in double rows . . .	36 inches apart
Barley in triple rows . . .	30 inches apart
Wheat in double rows . . .	36 inches apart
Wheat in triple rows . . .	30 inches apart
Corn in single rows	42 inches apart
Potatoes in single rows . .	42 inches apart
Sunflowers in single rows .	42 inches apart
Sudan Grass in double rows.	36 inches apart

This series will be repeated in duplicate 0.05 acre plots, except the Sudan grass, and will rotate or alternate with wheat each year. Since results obtained at Saskatoon will not be convincing or

conclusive for other districts, it would be well if an experiment like this or very similar to it could be conducted at other experimental farms in the three Prairie Provinces. We will welcome any co-operation that may be had in giving the whole proposition a thorough trial.

We will also endeavour to secure 100 volunteers among farmers who will try

growing oats in rows as a fallow substitute. Thus any unforeseen difficulties that may be concealed in the future with reference to this method of culture will be brought out.

In this paper we have endeavoured to set forth a fairly complete résumé of the past, present and future as related to growing grain in rows as a partial substitute for fallowing.

WHEY BUTTER

BY H. H. DEAN, B.S.A., PROFESSOR OF DAIRYING, ONTARIO AGRICULTURAL COLLEGE

DURING the summer of 1921 a study of whey butter was made jointly by the Dairy and Bacteriological departments of the Ontario Agricultural College, and co-operatively with the Wisconsin Experiment Station at Madison. Altogether eleven sets of experiments were conducted, but bacteriological tests were made on but two lots—May 13 and 20.

The plan of the experiments was to mix in one vat all the milk received for cheesemaking for the day, which averaged about 1,500 pounds. Out of this was taken from 150 to 200 pounds milk, which was separated and the cream churned. The remainder of the milk in the vat was made into cheddar cheese in the usual way. The whey was run through either a Sharples or DeLaval whey separator. The whey contained from .2 to .3 per cent fat, averaging about .25, at the time it was removed from the curd, or at the stage of cheesemaking known as "dipping." Both lots of cream were cooled immediately after separating and were kept practically

sweet until churned next day. Part of the lots (May and June) were churned raw, and part were pasteurized. The average acidity of the milk cream at the time of churning was .24, and of the whey cream .2 per cent. The average churning temperature of the milk-cream was 54°, and of the whey-cream 52° F. The average time required for churning the cream separated from milk was 32.8 minutes; that for cream separated from whey was 22.4 minutes. The average tests of fat in the buttermilk were .55 and .89 respectively for the milk and whey cream lots.

Pound print samples of the first two tests were scored at the end of one week, and again at the end of one month, after holding at a temperature of about 45° F. in cold storage at the dairy. The remainder of the lots were packed in fourteen-pound boxes and sent to the Government grading station at Toronto where they were scored when fresh; and again after holding in cold storage for three to six months. The average of all scores of butter were:—

	Cream Separated from Milk		Cream Separated from Whey	
	1st Score	2nd Score	1st Score	2nd Score
Flavour (Max. 45).....	38.13	37.09	37.77	36.73
Total (Max. 100).....	92.09	90.96	91.75	90.69

THE AGRICULTURAL GAZETTE OF CANADA

The average difference in the first and second scores for flavour was .36 point in favour of the lots made from separated milk. Each lot lost 1.04 points in flavour during the time it was held in cold-storage, and both lost practically the same number of points in total score. There was practically the same relative

differences in flavour between the raw and pasteurized lots, both when fresh and after holding in cold-storage, in the case of butters made from separated milk-cream and whey-cream.

The following bacteriological data has been furnished by Professor T. H. Lund:—

SAMPLES TAKEN MAY 13 AND 14

Acidities	May 13 samples		May 14 samples
	When fresh	24 hrs. at 25° C.	When churned
Milk..	0.20	0.88	....
Milk-Cream..	0.16	0.48	0.36
Whey..	0.17	0.54	....
Whey-Cream..	0.16	0.40	0.30

Figures indicate percentage of acidity calculated as lactic acid.

Bacteriological Counts		May 13 samples			
Milk..					2,800,000
Milk-Cream (40% Fat)..					42,000,000
Whey..					8,400,000
Whey-Cream (38% Fat)..					43,000,000
		May 14 samples			
	Bacteria	Yeasts	Oidium	Penicillium	
Milk-Cream..	125,000,000	1,500	170	1	
Milk-Cream-Butter..	6,000,000	380	35	11	
Whey-Cream..	85,000,000	120	1	14	
Whey-Cream-Butter..	5,000,000	100	0	11	

Figures indicate colony count per gram of milk, whey, cream or butter.

SAMPLES TAKEN MAY 20 AND 21

Acidities	May 20 samples		May 21 samples
	When fresh	24 hrs. at 25° C.	When churned
Milk..	0.24	0.78	....
Milk-Cream..	0.18	0.57	0.30
Whey..	0.18	0.48	....
Whey-Cream..	0.17	0.48	0.20

Figures indicate percentage of acidity calculated as lactic acid.

Bacterial Counts		May 20 samples			
Milk..					19,000,000
Milk-Cream (34% Fat)..					54,000,000
Whey..					35,000,000
Whey-Cream (31.5% Fat)..					40,000,000
		May 21 samples			
	Bacteria	Yeasts	Oidium	Penicillium	
Milk-Cream..	209,000,000	270	6	12	
Milk-Cream-Butter..	2,050,000	30	0	27	
Whey-Cream..	113,000,000	200	150	9	
Whey-Cream-Butter..	1,600,000	90	1	26	

Figures indicate colony count per gram of milk, whey, cream, or butter.

"One point brought out by the above figures is the slower development of acidity in the whey and the whey-cream, compared with that in the milk and the

milk-cream. This is probably due to the removal of certain constituents from the milk and cream during the cheesemaking process."—Professor Lund.

Conclusions

1. A very fair quality of butter can be made from whey-cream, which compares favourably, when fresh and when held in cold-storage, with butter made from similar cream that has been separated from whole milk. Because of the small quantities of milk and whey we worked with, the quality of the butters was not so good as if larger volumes had been handled.

2. The differences in bacterial content between milk, cream, and whey-cream were not constant. The whey-cream butters were lower in bacterial count than the butters made from milk-cream.

The yeast and mould counts were not consistent, though the tendency was for higher counts in the milk-creams and milk-cream butters, as compared with the whey lots.

3. It pays to separate the whey at a cheese factory where there are 5,000 to 6,000 pounds or more of milk received daily throughout the summer season.

4. The keeping quality of whey-cream butter in cold-storage appears equal to that made from milk-cream. The average of the scores for texture of the lots made from milk-cream was 14.37; and of the whey-cream lots 14.35, indicating very little difference in this respect.

PROGRESS OF SEED POTATO CERTIFICATION IN BRITISH COLUMBIA

BY C. TICE, OFFICER IN CHARGE

THE results obtained from the first season's work in the inspection and certification of potatoes in the province of British Columbia have been satisfactory and encouraging. Eighty-nine growers, in nine districts covering a total area of 195 acres, received inspection of their crops; 175 acres passed the first field inspection and 157 acres passed the second field inspection. One tuber inspection was made after harvest and before the crop was graded, and a second tuber inspection is to be made this spring just prior to shipping.

The success so far of this work has been due to the fact that we have received the full support and co-operation of the growers. Every district that intended taking up the work on a large scale, formed a local potato-growers' organization, if one did not already exist in that particular locality. By this means, it has not only been possible to call the growers together whenever occasion warranted, but also to start each district growing one or two standard varieties.

The seed used as foundation stock varied somewhat in quality, although it had all been carefully selected. As no certified seed potato work had been carried on in this province prior to the season of 1921, there were two courses for the growers to follow in order to obtain good foundation stock. First, to use the best of local seed or, second, to import certified seed. On account of the season being somewhat advanced when some of the districts decided to take up the seed certification work, it was not possible to bring certified seed into those districts. Other districts because the cost of importing certified seed was very great, did not feel disposed at a time when conditions generally were not the best, to purchase imported certified seed. Growers in the Ellison district, near Kelowna in the Okanagan Valley, through the efforts of some of its more enthusiastic farmers and the assistance of the local bank, were fortunately able to purchase a carload of Minnesota certified seed potatoes. The car arrived at its destination in first class condition and

THE AGRICULTURAL GAZETTE OF CANADA

some of the very best potatoes imported into British Columbia, were shipped in at that time.

Districts that had to resort to the use of local seed for foundation stock secured the very best possible by selection of the tubers only. It was, of course, not possible to select seed free from leaf roll and mosaic disease, since neither of these diseases appear on the tuber. However, the results of our field inspections

last summer clearly showed that the amount of leaf roll and mosaic disease present in the seed was comparatively small.

The following table shows the source of seed, varieties grown, average percentage of leaf roll and mosaic diseases respectively; also the number of fields inspected in various districts during the season of 1921:—

District	Variety	Number of fields inspected	Source of seed	Average per cent leafroll	Average per cent Mosaic (severe)	Average per cent Mosaic (slight)
No. 1.....	Netted Gem.....	3	Imported Certified			
" 1.....	Irish Cobbler.....	11	"	.25		
" 1.....	Green Mountain.....	10	"			
" 1.....	*Unknown.....	1	local	3.00	10.00	
" 2.....	*Unknown.....	1	local	50.00		
" 2.....	*Mortgage-lifter.....	1	local	10.00		
" 3.....	Burbank.....	5	local			1.12
" 3.....	Up-to-date.....	8	local	.48	.25	.25
" 4.....	Jersey Royal.....	6	local	.31	.50	1.41
" 4.....	Netted Gem.....	20	local	.41		.57
" 5.....	Gold Coin.....	1	local			
" 5.....	Jones' White.....	1	local	.25	2.00	4.25
" 6.....	Sir W. Raleigh.....	5	local	2.89	.25	.25
" 6.....	Carmen No. 1.....	1	local	1.00		
" 7.....	Up-to-date.....	3	local	1.16		2.50
" 8.....	Up-to-date.....	2	local	2.85	1.00	1.75

*Fields planted with common stock and therefore not entered for seed certification purposes.

From the above table it will be observed that leaf roll and mosaic diseases do exist in British Columbia but in very small amounts. The value of the very best potatoes for seed purposes is clearly brought out by the small percentage of disease found in District No. 1.

The future for seed potato certification is bright. Through the assistance of an increased appropriation for this scheme for the season of 1922, it is hoped to extend the work to several new districts. Applications for inspection and requests for meetings to discuss the situation have already been received from twice as many districts as last year. One new district has twenty-five growers who desire to take up the seed potato certification work. We are not encouraging districts to take up this work on a large

scale to start with, but rather to start in a small way and do the work thoroughly.

Number of Inspections

The following inspections will be made in connection with seed potato certification work in this province in 1922:—

(a) *Early Summer Inspection of Field.*—This will be made at bloom-time.

(b) *Late Summer Inspection of Field.*—This will be made as nearly as possible four weeks after bloom time in inspection.

(c) *After Harvest Inspection.*—This will be made before the crop is graded.

(d) *Shipping Inspection.*—This will be made after the crop is graded and immediately prior to shipping.

STANDARDS FOR INSPECTION FOR 1922

I. FIELD INSPECTION

(A) *First Field Inspection* (Early Summer):—

Foreign (impurities)—Not more than 5 per cent will be allowed.

Curly dwarf leaf roll mosaic.—Not more than 5 per cent of the combined diseases will be allowed.

Wilt—Not more than 3 per cent will be allowed.

Blackleg—Not more than 2 per cent will be allowed.

At this inspection the presence of rhizoctonia, and early blight, also the degree of severity of attack by these diseases will be noted.

(B). *Second Field Inspection* (Late Summer)

Foreign (impurities) Not more than 2 per cent will be allowed.

Leaf roll curly dwarf mosaic—Not more than 2 per cent will be allowed for combined diseases.

Blackleg wilt—Not more than 2 per cent of the combined diseases will be allowed.

At this inspection the presence of late blight, and rhizoctonia, also the degree of severity of attack by these diseases will be noted.

N. B. Rogueing must follow each inspection. In view of the fact that leaf roll and mosaic diseases may be transmitted from diseased to healthy plants by insects during the growing season, it is desirable for growers not to wait for advice from the inspector before rogueing their crops, Rogueing should be carried on regularly throughout the entire growing season.

II. TUBER INSPECTION

Rhizoctonia—Not more than 10 per cent of slight rhizoctonia will be allowed.

Not more than 3 per cent of severe rhizoctonia will be allowed and no scurf spot larger than one-eighth inch in diameter will be allowed.

Occasional spots will constitute slight rhizoctonia.

Stem end discolouration:—Not more than 3 per cent will be allowed.

Late blight or dry rots—Not more than 2 per cent will be allowed.

Powdery scab—No severe powdery scab will be allowed.

Not more than 1 per cent slight powdery scab will be allowed.

Occasional spots will constitute slight powdery scab.

Common Scab—No severe common scab will be allowed.

Not more than 5 per cent of tubers with slight common scab will be allowed.

By severe common scab is meant infections—

(a) covering more than 5 per cent of surface of tuber,

(b) taking the form of cavities.

Net Necrosis—Not more than 5 per cent allowed.

Internal brown spot—Not more than 3 per cent allowed.

Silver scurf—Not more than 5 per cent allowed.

For the combined diseases, late blight or dry rots, stem end discolouration, rhizoctonia (severe), not more than 2 per cent will be allowed. For the combined diseases, late blight or dry rots, stem end discolouration, rhizoctonia (severe), net necrosis, internal brown spot, silver scurf, not more than 5 per cent will be allowed.

For the combined diseases, late blight or dry rots, stem end discolouration, rhizoctonia (slight) and common scab (slight) not more than 7 per cent will be allowed.

For the combined diseases late blight or dry rots, stem end rot or discolouration, rhizoctonia (slight), common scab (slight), net necrosis, internal brown spot and silver scurf, not more than 10 per cent will be allowed.

GRADING

Certified seed potatoes should conform to desirable commercial grades. The following grading regulations must be strictly observed.

(1) Potatoes shall not be less than 3 ounces or more than 12 ounces in weight, where one grade is made. Those growers who desire to make two grades: one to supply those who plant small whole seed, and the other to supply those who plant cut seed, will be allowed to use 2 ounce potatoes in their small whole seed grade.

(2) Potatoes shall be of good appearance and reasonably true to type, shape, colour and general appearance and shall not be mixed with potatoes of other type or types.

(3) Potatoes shall be practically free from second growth, growth cracks, bruises, cuts, badly skinned potatoes, or injuries from other causes that are likely to cause rot.

(4) Potatoes shall be practically free from dirt or other foreign matter or damages caused by mechanical means.

A tolerance of 5 per cent by weight is allowed for the above combined defects.

(5) Potatoes shall be free from soft rots of all descriptions and from frozen tubers.

Growers whose crops are passed as certified seed will receive both a certificate and tag; the latter to be attached to each sack available for sale by the inspector or some other duly authorized person at the time these potatoes are about to leave the hands of the growers. The certificate will be issued after the final inspection.

General Recommendations

Growers should adopt up-to-date methods throughout the whole season in order that their crops may reach the required standards.

Although seed disinfection and spraying are not compulsory measures in the growing of certified seed potatoes, nevertheless all growers are advised to disinfect their seed before planting and to spray in those districts where spraying is advocated by the Department.

PART III

Agricultural Education and Related Activities

AGRICULTURAL EDUCATION IN ONTARIO

Progress in Schools Below College Grade

BY DR. J. B. DANDENO, INSPECTOR OF AGRICULTURAL CLASSES

DURING 1921, in Ontario, continued steady progress is apparent, especially in the Public and Separate schools, not only in number of schools undertaking to give regular instruction in agriculture, but also in the character and usefulness of the work. These agricultural educational activities which are under the direction and control of the Department of Education fall into four classes:—

- (1) Public and Separate Schools,
- (2) High Schools, Continuation Schools and Collegiate Institutes,
- (3) Normal Schools,
- (4) Summer Courses in Agriculture for teachers.

The progress of this work in the Public and Separate schools is shown by the fact that, though the introduction of Agriculture as a school subject is optional, there were close to 2,000 schools with classes in agriculture in 1921. In 1920 there were 1,648 such schools. This number includes both urban (graded) and rural (ungraded) schools. Close to 25,000 pupils in these schools received instruction in agriculture in 1921. About two-thirds had school gardens. The grants to boards and teachers of the Public and Separate schools are based upon the school year. For the high schools the grants are based on the calendar year. In 1921 there are thirty high schools maintaining classes in agriculture and four Public schools with fifth forms. Of the high schools three

carry on "Departments" of Agriculture which are semi-vocational. Practically all of these schools have plots of land, owned, rented or obtained free. In the high schools about 1,000 pupils receive instruction in agriculture.

Regular instruction in agriculture is given to the teachers-in-training in the Normal schools with some practice in the management of school plots. In 1920-21, about 1,330 students received such instruction.

Financial assistance is given by the Department of Education in the form of grants to the board for equipment and a small grant to the teacher. In the school year of 1919-20, \$61,750 was paid out for this. In 1920-21 it will require about \$80,000. None of this money is used for building or for accommodations, nor yet for prizes either in connection with school fairs or otherwise. The teachers of the Normal schools receive no agricultural grant.

The Summer Courses in Agriculture for teachers are now held at three centres—the Ontario Agricultural College, Guelph; the Ontario Ladies' College, Whitby; the Northern Academy, Monteth. In 1921, 524 teachers attended these summer courses at these centres at an expense to the Department of Education of \$23,141.89 for board, lodging and travelling expenses, and \$10,875.75 for instruction.

SUMMARY

The Department of Education paid out in 1920 approximately as follows:—

Public and Separate Schools ..	\$ 77,000 00
High and Continuation Schools.	14,131 60
Summer Courses—	
Instruction	9,910 00
Refund of expenses.	22,842 00
Salaries and travelling expenses.	4,200 00
	<hr/>
	\$128,083 60

Federal Assistance

The amount received from the Federal appropriation under the Agricultural

Instruction Act was \$40,000, which was less than one-third of that required to carry on the work. The figures for 1921 are not yet complete, but it is quite likely they will reach \$150,000.

From the Federal appropriation referred to above, the province of Ontario receives annually \$336,274.96, so that the Department of Education receives only about one-eighth of the money appropriated for Ontario.

THE SCHOOL IN THE RURAL COMMUNITY— *Concluded*

BY G. V. VAN TAUSK, M A., B.Sc. (OXON), B.S.A.

Some of the Practical Work

The practical work of the schools can be divided into—

- (a) Home projects;
- (b) Booklet work;
- (c) Correlation with regular school subjects;
- (d) The teaching of agriculture, manual training, or domestic science, *per se*;
- (e) Work done by the school for the community;
- (f) Boys' and girls' clubs;
- (g) Community work.

Home Projects.—In many States of the Union and in some of our Provinces it is now becoming the practice to give credit in school for certified work done at home. Such home work as the teacher is qualified to supervise should receive her attention. Suitable home projects are potato growing, poultry keeping, simple gardening, home reading, the rearing and care of pets, the rearing of pigs, beautifying the home grounds, canning of fruit and vegetables, needlework, etc. There is no teacher, however poorly qualified, who cannot fit herself in a short time to give instruc-

tion and direction in some form of useful home work. The influence of the school must reach the place where the training is to take root, and that is the home and the farm. In the writer's opinion, the proper use of the home farm for purposes of practical work and instruction can be made to yield results superior to any that can be obtained on school property. The best example of what can be accomplished in this manner is the Massachusetts Home Project Plan. In that State this method of instruction is made the basis of government grants. There are two distinct parts to this project plan. The first is the productive work supervised by the instructor; and the second is study directly related to that productive work.

Another interesting phase of this plan is that the boy or girl is not only doing while learning, but earning. This combination of earning, doing and learning will solve the difficulties in connection with keeping children in school. Considered from every point of view, the success of the home project plan depends on careful supervision, but if such exists it offers great possibilities in agricultural education.

Booklet Work.—It is a good plan to make illustrated booklets telling the story of work done at home or in school. This gives the pupil a chance to put what he has learned in a permanent, attractive form and to open an avenue for originality. It combines work in planning and execution, investigation, selection, English, art, penmanship, review, accuracy, system, and condensation, and calls for the exercise of judgment all along the way. Professor Benson says: "I think I have never undertaken any one scheme in agricultural educational work fraught with so much significance."

The pupil should start booklets on plants, seed selection, animals, hobbies, or what not. They may be most of the school year making the booklet, but whenever they get a page good enough to keep, they should have a place in which to keep it. The booklets may contain the history of the plant, its value for food, how to breed it, how to cook and prepare it, and how to keep it. Covers may be made for the booklets as part of the work in drawing. The farm journals, the catalogues of seed houses and the nurseries furnish illustrations, pictures, letters for lettering, and valuable suggestions for such matter. These booklets, when finished, should be marked and judged, allowing 20 per cent each for the following: Contents, neatness, originality, amount, arrangement. The great advantages of the booklet method in instruction are: First, pupils like to do the booklet work. Second, the making of the booklet helps to crystalize the pupil's knowledge. Third, each pupil works by himself and on a subject in which he is interested. Fourth, booklets are really permanent notebooks. The home folks like to see the systematized, clearly and definitely expressed knowledge of the child in attractive, permanent form. Fifth, each child likes to make collections and investigations even with the least of direction. The information gathered by any one child should become

the common property of all the children of the school. Incidentally, this method of teaching is a very good introduction to the more formal study of Nature Study, Agriculture and Domestic Science.

Correlation With Regular School Subjects.—The agricultural, domestic science or any other practical work done in the school should always be the basis of the other school subjects, reading, language, arithmetic, spelling, etc.

Supplementary Reading. For supplementary reading use Dominion and Provincial bulletins. Have pupils read for the thought on the printed page. Have them make both oral and written reports. Have them learn poems relating to agricultural subjects. Let them read those parts of books treating on the topics under discussion.

Grammar and Composition. Have oral discussions on field trips. Write neat reports. Save some of the better pages for booklets. Pay particular attention to neatness, spelling, grammar, punctuation, capitalization, paragraphing, etc. Take time to call attention to new words when introduced.

Arithmetic. Measure fields, buildings, bins, hay-stacks, yards, posts, distances between posts, etc. Calculate costs, capacities, values, etc. Supplement arithmetic with problems that are coming up at home. Collect problems on farm management. Use figures that represent real farm conditions.

Geography. Geography of the school district, latitude and its connection with the crops being grown, weather and its influence on agriculture, climate as it affects what can and what cannot be grown, number of days' work in the year, history and civics. Study the relation of industries and inventions and the development of the country. Have pupils make, as part of their booklet work, historical studies of various crops, animals and plants in the district. Make a study of transportation, history, problems, etc. Make a study of the influence of good

roads. Study road laws, weed laws, land surveys, the history and influence of the Mounted Police, food and seed laws.

Physiology. Study farm products as food and their relation to diet. Call attention to similarity of structures and diseases of farm animals and people. Discuss creameries and care of food as a hygienic matter and as a business matter. Study sanitary and hygienic relations to home and farm conditions, equipment, activities, etc.

Drawing and Writing. Draw the whole or parts of plants, animals and objects being studied. The aim should be to represent just what is seen by study of the actual object. Draw maps of farms to show layout, rotations, etc. Be sure not to accept any pages for booklets unless well written.

Music. Have pupils learn songs that pertain to rural life as "Queen Autumn," "The Farmer," "Song of the Harvest," etc.

Industrial Work. Have pupils make a germinating box, garden devices, handy articles, etc.

As it can be seen, a correlation of studies as outlined above will cut down the time required for the formal teaching of the subjects of agriculture and other practical work to the minimum, give just as much useful information and have the same educational value.

The Teaching of Agriculture, Manual Training, or Domestic Science, per se.—As a formal school subject, it is an open question in the minds of many of our old-fashioned educators whether agriculture, or domestic science, or any other form of practical work can be legitimately placed within the public school curriculum. It may be pointed out that wherever introduced and handled by properly and specially trained teachers, it has proved a success. In the Province of Alberta it was not a success due mainly to its having become a text-book subject instead of a practical one, and also due to the lack of preparation of the teachers. The

curriculum is being changed so as to make agriculture a teachable subject and facilities are being given for teachers to acquire the necessary training. It is hoped that with the coming of a new government, which draws its strength from the rural communities, more emphasis will be put on the teaching of these subjects in the public, and especially, rural schools. It may be strange, but with the one exception of the Province of Alberta, every province in the Dominion and practically all the States in the Union have officials whose duty it is to help, assist, supervise, guide, etc., in elementary agricultural education. Their office is an Information Bureau for teachers. They are the connecting link between the educational authorities and any outside agency concerned with agriculture or rural betterment. There is an absolute necessity for such an official in Alberta, and not until we have such can we hope to have agriculture successfully taught as a formal school subject.

Work Done by the School for the Community.—There are several types of school activity which may be of a direct, economic benefit to the children's parents in particular, and the community at large in general. In this connection may I mention that, when a student at some State agricultural college, Professor Holden made the casual remark that he would make two ears of corn grow where only one grew before. His prophecy came true. On the same acreage the corn crop of the State of Iowa has been doubled and this was almost entirely due to seed judging and testing, introduced through and done by the public schools of that State. In Alberta there are four activities of a similar nature, to wit: Milk testing for the purpose of keeping cow records; seed grain judging; potato selection; and egg candling and grading. When we suggested these activities to the director of the Summer School he immediately fell in with the idea and

hence a great deal of our time in the agricultural course of the Summer School is taken up with these matters. These activities lend themselves admirably as contact points between the home and the school. One cannot in a short space of a lecture go into details of the methods to be used, but even if you have not taken a course in the above, very good bulletins are published on all of these subjects.

Boys' and Girls' Clubs.—The boys' and girls' club movement is well established in this province and is done under the direction of the Department of Agriculture. The results of the efforts of the club members are usually exhibited at the school fairs. However, in very many instances there is not sufficient co-operation between the school work and the club work. The starting point for club activities should be the rural school. The teacher has to be the guide. Another difficulty often met with in connection with club work is the lack of a definite system in judging the work of the members. The following tables are intended for guides to show the value of the various phases of the work. Take for instance a girls' garden and canning club:—

Age: 10 to 18 years, inclusive.	
Acreage: One-tenth acre, chiefly such vegetables as can be canned.	
Basis of Award:	
1. Quality.....	20
2. Quantity (total lbs. of vegetables harvested and used) ..	20
3. Variety of canned products. . .	20
4. Profit on investment.....	20
5. Written history on "How I Made My Vegetable Crop"....	20
Total score.....	100

Boys' and Girls' Potato Club:	
Age: 10 to 18 years, inclusive.	
Acreage: One-eighth acre.	
Basis of Award:	
1. Greatest yield per one-eighth acre.....	40
2. Best showing of profit on investment.....	30
3. Best exhibit of one peck of seed potatoes.....	15
4. Best written history on "How I Made My Crop of Potatoes".....	15
Total score.....	100

The personal touch in an association should not be under-estimated and hence the teacher when possible to do so should have a club leader come to her school and talk not only to the children but, wherever possible, to their parents and the ratepayers in general. The line of work to be taken must be considered carefully. Then the question of how many clubs, whether one for both boys and girls, or one for boys and one for girls, must be decided. Age, ability, local conditions and things of importance in the community all have to be considered. It is important in so far as possible that all pupils of the school should take part in some club. It came within our observation that clubs are a great factor in keeping boys in school. A Russian boy of our acquaintance had decided to quit school when his teacher organized a poultry club. He changed his mind and became one of the most interested and loyal members of the club and, incidentally, remained in school up to and including the eighth grade. This is by no means an isolated case.

Community Work.—Foght says: "The new conception in education is to so organize the schools as to reach all the people who need inspiration and assistance to surmount the high and difficult places in life and thereby extend to them the real blessings of a democratic government."

Does our present-day rural school offer reasonable hope of performing the task assigned to it above? Every teacher, yes, every citizen, should be interested in this question and know where improvement can be made. Obviously, the school is the educational centre of the community, but in most instances only for those members of the community between the ages of six and fourteen, but education is a process which lasts all through life and all educational measures which require special building, an organized centre, and expert guidance should find their home in the rural school. Continuation classes for use above fourteen years of age, night

classes, short courses, women's institute meetings, etc., should be in the school, and the teacher should be an integral part of these organizations. The school is also, or rather, should also be a social centre. It usually is centrally located, and if movable desks are installed makes an ideal place for the social gatherings of the community. Church services may be held there, harvest festivals, farmers' meetings, dances, or what not, and the teacher in order to do really worthwhile work should take a part in all these functions and activities. When teaching in a French-Canadian community in Manitoba, we closed our school to attend baptisms, weddings and funerals, and we thoroughly believe that by doing so we became part of the community to such an extent that we had the hearty co-operation of the ratepayers in improvement which we suggested for the school.

Another community activity that can be done by the school and which usually creates a great interest in the home, and also is of great value for the growing-up generation, is the study of country houses and country homes. Such topics as the country home and the country woman, beauty in the country, landscaping, gardening, sanitation, labour-saving conveniences, food for the country home, farm planning, should be treated when the occasion arises. An interesting and instructive activity for the scoring of country houses and country homes is on the following plan:—

Country House Score Card—	Points
Plan.....	35
Exterior appearance.....	25
Interior equipment and furnishings.....	25
Setting arrangements of paths and gardens.....	15
Total score.....	100

Country Home Score Card—	Points
1. Beauty.....	10
2. Wise expenditure of money.....	15
3. Sanitation.....	20
4. Modern conveniences.....	15
5. Labour-saving machines.....	10
6 Food.....	30
Total score.....	100

If a teacher has time and inclination to score the homes of his community in the above manner and put the result of his investigation at the disposal of the proper authorities, he will have done a great deal in adding to the existing store of knowledge which may be utilized in solving the rural life problem.

General.—One of the problems that the teachers meet with very often is the sequence in which to teach agricultural subjects. The following is suggested:—

FALL

- (a) Seed Selection, Insects, Birds, Weeds, Housing Farm Crops and Animals, Feeds and Feeding.
- (b) The Plant, Plant Breeding, especially Hill Selection of Seed Potatoes.
Stock Judging, Grain Judging, Fitting for Shows.

WINTER

- (a) Care of Farm Animals, Ventilation, Dairying, Field Management, Crop Rotations, Drainage.
- (b) Farm Accounts, Farm Machinery, Seed Testing and Analysis, Soils, Conservation of Moisture, Fertilizers, Landscaping, Birds, Weeds.

SPRING

- (a) Planting and Cultivating, Farm Crops, Poultry, especially Care of Young.
- (b) Flies and Mosquitoes, Gardening, Fruit Growing, Insects. If necessary, use (a's) for a first-year course and (b's) for the second year.

Lesson Plan.—There is no place within the scope of a short paper to give definite lesson plans, but the following points must always be kept in mind: Preparation, presentation, comparison, generalization and application. To give an example, the lesson is Hen's Eggs:—

To learn how to breed hens for more eggs.—The preparation will consist in showing that our hens lay on the average only 80 eggs per year and they could lay between 170 and 200.

The presentation would have reference to the egg-laying breeds, their method of housing, care, feeding, trap nests, etc.

The comparison would refer to the trap-nest method and the ordinary method used to the use of male birds from egg strains and common strains.

The generalization: There are two methods of breeding. First, the trap-nesting and second, using the male from trap-nested stock.

Application: Read to learn if there be a still better method. Visit a poultry plant, or still better, take charge of part of the poultry flock at home for a home project.

Conclusion.—Obviously, there are a number of other factors which should enter into the solution of the country life problem, but sufficient data was given to show that there is a country life problem and also that the rural school can greatly assist in solving it. To a very great extent the three factors of solution, knowledge, education and organization, can be carried on by teachers using the rural school as the centre

of their activities. The time must come when we are going to educate to the farm instead of from the farm. This must be pre-eminently the work of the rural teacher.

We have no doubt in our mind that should even a part of the above outline be intelligently followed in any school it will greatly add to the life of the children, and we are satisfied that if the general public and the rural community especially would pay as much attention to the education of their children for rural life as they pay to economic betterment, Alberta would become the premier province of the Dominion in rural contentment.

May it be pointed out that agriculture and all the practical in education must first be taught by effective correlation rather than by general lessons in the daily class work. The famous anecdote told about Abraham Lincoln in relation to the farmer boy applies even more to the rural teacher. Lincoln was asked by a farmer friend of his who had five sons what he should make of them, to which he immediately replied, "Keep the smartest boy on the farm and let the rest of them study law." May I paraphrase this by saying, "Keep the most enthusiastic teachers in the country and let the rest of them teach in the city schools."

THE SCHOOL EXHIBITION—WHEN AND WHERE

IN submitting the following article Mr. J. W. Gibson, Director of Elementary Agricultural Education for British Columbia, advances the opinion that the time has arrived for making the School Fair a permanent institution, linked throughout the year with the regular school programme. It should no longer be regarded, he says, as 'a fetching school stunt,' but rather as the culmination of a sequence of studies conducted under the direction of modern

educationists. The question then presents itself as to whether the logical time for holding the Fair would not be at the end of the school year's work in June and before teachers and pupils disband.

Mr. Gibson made the suggestion that an expression of opinion on this matter might be secured from those who were associated with school fair work in other provinces. A number of authori-

ties have contributed their views on the subject, and their articles follow in succession.

It will be noted that in British Columbia the School Fair constitutes a feature of the regular Fair, whereas in Ontario and in most other provinces it is usually a separate and distinct institution, and that behind the teacher stands the agricultural representative, the school inspector, the rural education association or some other equally efficient organization.—*Editor.*

IN British Columbia, School Fairs are usually held in conjunction with the regular fall fairs, all details as to prize lists, staging of exhibits and judging of the same being in the hands of a teachers' committee representative of the district. In most cases the teachers are also represented on the Board of Directors of the Agricultural Society under whose auspices the fairs are held. Practically all of the fifty odd fairs held in the province last year included school children's classes, and in quite a large number of cases the school exhibits formed one of the greatest attractions. In some instances the chief difficulty has been in connection with the securing of suitable and adequate accommodation for the large volume of exhibits sent by the schools. At Chilliwack, for example, the Agricultural Association has found it necessary to provide two new buildings—one last year and another this year, chiefly on account of the ever increasing number of entries in the schools' section. The teachers and pupils of the city and district helped to meet the cost of these buildings.

In the main the Boards of Fair Directors in British Columbia have been thoroughly alive to the importance of the school fair, both from the standpoint of educational values and added attraction and general interest.

In one of the leading agricultural districts the teachers are now consider-

ing a plan whereby they will put on a school fair towards the close of the school year—probably about the middle of June. Such a fair, they believe, held at this time would have certain advantages, and would help to get over some of the practical difficulties which always have to be reckoned with. There would not be the same crowding of exhibits and the consequent lack of suitable arrangement which so often exists when school exhibits are housed in the same building with general fair exhibits. The teachers would all be on hand to organize the school fair with the pupils whom they had been teaching during the year. At present many new teachers take office at the beginning of the school year in September and are not in a position to give much assistance in planning and carrying out a school fair almost immediately after taking up their new duties. In June the pupils are still in the classes which they have been in during the year, so that it appears the logical time for the exhibiting of school work. The school fair, when held in June, would help to constitute an objective towards which teachers and pupils would work during their year together. In this way the school fair would have increased educational value and would more fully reflect the real character and extent of the school work for the year, not in one or two special lines as is so often the case, but in all subjects and departments of school activity. It would become a real parents' and children's day. The children and their exhibits would not become so much submerged in the crowding and the general hubbub of the general fall fair. If the school fair were held on the school grounds as would usually be the case, the opportunity would be afforded to parents and to the general public to see the whole school plant—class-rooms, equipment, grounds and gardens—in working order, and this in itself is well worth while.

The holding of the school fair in June would not necessarily mean that the schools would not take part in the fall fairs as is the usual custom. It would mean, however, that the range of exhibits from the schools would be considerably lessened and that they would be largely confined to the realm of agriculture. Field and late garden crops, poultry and livestock exhibits would be most in evidence, and properly so. It would not be a bad thing if many of the non-agricultural exhibits were eliminated from our agricultural fairs. Furthermore, if our agricultural fairs are to fill the important place in the agricultural life of the country which they were originally intended to fill, more drastic measures will have to be adopted to protect the people and particularly the school children from the unwholesome influences of the ordinary "midway." Merely restricting the number of fakirs will not suffice. Complete elimination is the only remedy. Some associations have already done this.

One of the finest attractions at our fall fairs last year was the club exhibits of pigs, calves and poultry. An impetus to the breeding of purebreds has certainly been witnessed through club work in connection with a number of the schools and through the exhibiting of prize stock at the fairs. To have carried for a season the full responsibility for the feeding and management of a valuable young animal, to have watched its continued development in response to that care and finally to have brought it into competition for honours with others of its class, whether winning or losing, means more than profit and loss as usually estimated. It means the developing of certain qualities of true manhood and womanhood, which this country will profit by and which it will need more of in the future.

Another very interesting feature in connection with five or six of the larger fairs was the establishing of junior stock-judging contests for boys and

girls under 18 years of age. Teams of boys and girls from different parts of the province drawn mostly from high school agricultural classes, met at the Vancouver and New Westminster fairs and engaged in these contests, having been previously trained by skilled instructors. A judging team consisted of three members—either boys or girls. At the New Westminster Fair no less than eleven teams lined up for this contest. The teams were entertained there most generously by the Fair authorities who also paid the train fares of all competing teams. At the close of the contest a most enjoyable banquet was tendered to the members of the teams, their respective coaches and a large number of others who were associated with the undertaking. We are looking forward to a splendid year in this as in other lines of work in educational agriculture.

**By Dr. J. B. Dandeno, Inspector
of Agricultural Classes,
Ontario**

The School Fair organizations in Ontario are under the direction of the Department of Agriculture co-operating with the Department of Education through the agency of the Agricultural Representative of the district in the former case, and through the Public School Inspector and teachers in the latter. The linking up of these two departments in school fair activities has accomplished magnificent results and the outlook under this arrangement for the future is promising.

A proposal to place the date of the school fair towards the close of the school year, that is towards the end of June, instead of in the fall, would not meet with much favour in Ontario, because of the fact that the "Fair" idea is directly agricultural and is concerned altogether with agricultural products and activities, whether in the nature of soil products or of animal husbandry,

which follow naturally the calendar year, or rather the season, running from spring to fall. If a fair were held during this season, as early as June, there would be little or nothing to exhibit.

The school fair projects in Ontario deal with garden, orchard and farm crops, and with live stock, such as the rearing and management of calves, colts, chickens, etc., with collections of weeds, seeds and insects, and with canning of fruit grown generally by the exhibitor.

Mr. Gibson points out that in British Columbia the school fair has become so linked up with township or county agricultural fall fair that the one has absorbed the other, and that the school end of it consequently suffers on account of a lack of accommodation.

In Ontario, however, the school fairs have not been united with other fall fairs, although some years ago an effort was made, here and there, on the part of the fall fair officials, to have the school fairs join with them. The school fair organization, in all cases, refused to do this, preferring to run their own show.

The arguments put forth by Mr. Gibson for a change of date do not apply to Ontario. The reason he gives for advocating a change may be inferred from the following statements taken from Mr. Gibson's letter introducing the matter: "There has been too much grandstand play about it." "The teacher constitutes the chief factor in the success of this and similar educational enterprises." . . . "This can be accomplished only under the direction of thorough-going modern educationists." In Ontario school fairs are not troubled with what Mr. Gibson calls "fakirs" or the "Midway," and they are wholly under the direction of modern educationists—the teacher, the inspector and the agricultural representative. To change the date from the fall to June, or to have two fairs, one in the fall and one in June, would be a mistake.

**By S. T. Newton, Director Agricultural Extension Service,
Manitoba**

In Manitoba the school fair, while an important phase of Boys' and Girls' Club work, is by no means the most important feature. In fact it is only a means to an end and the end is the development of a wider knowledge and experience on the part of the boys and girls in better agricultural and home economics methods. It serves the purpose also of getting the young people to have a keener interest in rural life and rural pursuits.

An effort is being made to have club work function throughout the entire year. At one time sports are featured, at another time hikes, garden socials, debates, entertainments, achievement day programmes, etc.

Demonstration team work is a phase of club work carried on for the past three years which bids fair to be one of the most useful agencies in training both the boys and girls.

A demonstration team consists of three boys or three girls—a captain and two demonstrators. Usually the members of the team range in age from fifteen to eighteen years, but any "teen-age" boy or girl is eligible to take part. The fundamental idea in team work is that one or other members of the team is talking while the other two are demonstrating some phase of the subject. A demonstration lasts about forty minutes and the members of a team, in their desire to make their demonstration a success and a source of information for those who have an opportunity of listening to them, read all the bulletins, books and advertising material that they can obtain. Competitions are held in each inspector division, and the winners are given a trip to Winnipeg in September, with all expenses paid by commercial firms like the T. Eaton Company and the milling companies, and a whole week

of education, sight-seeing and entertainment. Demonstration teams are now working on the following subjects:—

Treating Grain for Smut.	Flour.
Grain Judging.	Textiles.
Stock Judging.	Flavouring
Vegetable Judging.	Extracts.
Grain Marketing.	Beverages.
Potatoes.	Upholstering.
Milk Testing.	Eggs.
Lubricating Oils.	Milk.
Fuel Oils.	Table Setting.
Shoes.	Balanced Meals.
Wheat.	Patterns.
Flax.	Rye.
Canning.	Oats.
Dyeing.	Corn.
Laundry.	Macaroni.
Millinery.	Food Chopper.
Quick Breads.	Hot Lunches.
Bread.	Labour Savers.
	Home Cleansers.

The Inspectoral Division is taken as the unit for organization purposes and the school inspector recognized as the club leader in his district.

Co-operation is the key note in club work, the Departments of Education and Agriculture working in close co-operation, with the result that there is no conflict of purpose and the best energies of both departments are at the service of the clubs.

The Club Fairs are all held during the last ten days in September and the first ten days in October. The Agricultural Society Fairs are held during July and August, but even if it were satisfactory to hold the club fairs at the same time as the agricultural fairs, the time is inopportune as only 15 per cent of the exhibits are of school work and the vegetables, chickens, grains, live stock, canning, etc., would in no way represent what the children are doing. On the prairie, or any place else for that matter, a fair held at the end of June cannot possibly serve its purpose if the agricultural features are to be emphasized.

By Fred W. Bates, B.A., M.Sc.,
Director of School Exhibitions,
Department of Education, Saskatchewan

The first school exhibition held in Saskatchewan was organized by a group of teachers for the express purpose of placing before their public the work of the school. With the development of the movement, a wider form of organization has arisen, but the original ideal is still dominant. The inclusion of out-of-school activities such as pig-rearing, gardening or canning has intensified rather than weakened this desire, especially since the recognition of Agriculture and Household Science, as regular features of our public school course provides a link between the routine school work and these out-of-school activities.

The organization of Boys' and Girls' Clubs has introduced a new feature. By this means the out-of-school work has been organized more efficiently and in some instances phases of the routine school work have been included. In our province since May 1920 the School Agriculture Branch of the Department of Education has been responsible for the direction of both the School Exhibition and Club activities. The effort to co-ordinate the work has been most successful. During the past season 60 of the 64 clubs were organized by associations which also conducted the school exhibition; the other 4 were organized by Agricultural Societies.

Unless the exhibition is made the culmination of an educational project running throughout the year, it will soon forfeit its place in our school programme. It is comparatively easy to get up a good "show" on short notice but, although the first efforts are usually of that character, the well-established exhibitions are using every possible means to eliminate this serious defect."

In attempting to develop a true school exhibition, many difficulties are encountered. One of the chief problems is to determine the best time to hold the exhibition. To accomplish its true aim it should be held at a time not only when the greatest number of people could attend conveniently but also when the material shown would most truly represent the work of the school. In our province July and early August are the least busy of the summer months and during that period practically all the local agricultural fairs are held. This time however is not satisfactory for the school exhibition for a variety of reasons.

To make the point clear a brief description of conditions is necessary. According to the School Act, "In every rural and village district where school is to be kept open during the whole year there shall be at least seven weeks' holidays of which not less than one or more than six shall be given in summer, to be apportioned at the discretion of the board." Many schools, therefore, have the long vacation during the winter and open with new teachers in late February or March. On the other hand all town schools and the majority of the village schools have the long summer vacation. In these schools, change of teachers usually takes place during mid-summer which makes the early fall a period of re-organization.

Midsummer therefore is not a satisfactory time because the larger schools are closed for vacation and many are changing teachers. On the other hand, while June would seem most appropriate, exhibitions held at that time have not in general proved satisfactory. Bad roads and pressure of work hinder the attendance of adults and the fact that many schools have been open for comparatively short periods reduces the number taking part.

Another consideration in determining the best time is the character of the exhibition. If Agriculture is to receive

its proper recognition, the fair must be held after midsummer. Several associations have attempted to meet the situation by holding an exhibition of classroom work in June and another fair in the fall where the agricultural work was shown, but there is no indication that this method will become popular. It has been suggested that the exhibits in school agriculture should be shown at local agricultural fairs but, as these are practically all over before the middle of August, this would not improve the situation.

After considering the problem from every angle, it is apparent that the varied conditions in our province make the selection of a satisfactory date very difficult and absolutely prevent uniformity. September and October, however, while not ideal, have continued to be the most popular exhibition months. Of the 284 held in 1921 only 23 took place in May and June, 16 in July and August and the remaining 245 in September and October. Further, it is interesting to note that the teachers of a whole inspectorate, in attendance at their central exhibition, after trying the spring dates in 1921, decided henceforth to hold their exhibitions in the fall.

Not only should the school exhibition be the culmination of an educational project but the day itself should be definitely maintained as the outstanding "Children's Day" among community activities. To insure this it is almost necessary to hold the exhibition apart from any adult organization such as the ordinary agricultural fair. Experience has shown that when the school exhibition is linked up with adult activities, its distinctive educational characteristics are submerged by the amusement features of the programme. Only about ten of our exhibitions are conducted by organizations formed for other purposes, and notwithstanding the constant growth in the total of exhibitions held, the number thus organized shows a decrease from year to year. It

would seem, therefore, that the school exhibition will best serve its purpose and achieve its aim, when carried by an organization developed for that special work and through which other existing bodies may co-operate in making it the great event of the year for child and adult alike.

In conclusion it is pleasing to note that each year shows advancement toward the ideal and that these and many other problems such as arise in the preparation of exhibits and the allotment of prizes are gradually being solved as teachers and the general public come to understand the true place of the exhibition in relation to the school and its activities.

By L. A. DeWolfe, B.A., M.Sc.,
Director of Rural Science,
Nova Scotia

School Fairs will not be of value educationally until they represent every phase of Home and School work for the whole year. To secure this, there must be close co-operation between the parents and the teacher. Preparation must also begin at the beginning of the year.

One reform is vitally needed before School Fairs can be successful. That is, we must make the school year coincide with the calendar year. In such case, we should then have the same teacher at seed time and harvest. As it is now, with the school year beginning in August, the newly appointed teacher cannot organize a good fair for September. In most cases, she knows nothing of preparations on the part of the previous teacher; and, therefore, concludes that "next year we'll have an exhibition." Of course, "next year" she is gone, and a new teacher repeats the performance.

With the present arrangement of the school year, the only alternative is to hold the exhibition in June. We have advocated this for four or five years;

and in a few sections it has been carried out. Thus the exhibition becomes the public examination. At this time the year's school work can be exhibited; but the garden work is lacking. Some teachers have advocated two exhibitions—one in June and one in September. This will work so long as new activities keep up enthusiasm. There is danger, however, of both teacher and pupils tiring of such work.

Whichever solution is adopted, the exhibitions must become more educative. A few vegetables and flowers hastily gathered together; a little sewing snatched from the work-basket; a few rough boards nailed together and called "woodwork"; business forms and crayola drawings copied from the teacher's model on the blackboard; these, however well they may look at an exhibition, mean nothing more than hard work for the teacher and a few cents in prize money for the children.

Until the regular school notebooks, health charts, and daily records of the year's work are displayed at the end of the year, the exhibition will not be complete. Nor are these, in addition to the ordinary farm and household products, sufficient. Vegetable exhibits should be accompanied by statements explaining their growth and selection. The pupil should also display literature which he studied or consulted for garden information. Charts and maps showing correlation between gardening and regular school work are well worth while. Judges, or others competent to do so, might give short talks to the children on selecting prize materials.

Results of experiments are particularly desirable. These may include exhibits showing the results of different fertilizers, seed selection, land drainage; milk records on different food rations, etc. Here would come, too, new varieties of potatoes, dahlias, or gladioli, grown from seeds. Comparatively few children know how new varieties of our vegetables, flowers and fruits are obtained.

They will frequently tell us that such is the result of grafting (which, of course, is not true).

The best kept garden plot in each school section should receive local recognition. School parades, pageants, games, contests and sports, should be heartily encouraged. Public-speaking contests, or judging competitions, or debates on farm topics are particularly desirable.

Local exhibitions are valuable because all residents can attend. District exhibitions are desirable, however, because they help standardize the local fairs. Teachers should accompany their children to the district exhibition, and take charge of them throughout the day. It is a school exercise—not a holiday.

If school exhibitions should follow the educative suggestions here outlined, the larger exhibitions conducted by the grown-ups of the future will be much more worth while than they now are. At such time the "Fakir's Row" will not be the centre of attraction.

**By A. C. Gorham, M.Sc., Director
of Elementary Agricultural
Education, New
Brunswick**

To make the School Fair a more permanent part of the school programme is a condition greatly desired by those who have to do with the organizing of school fairs throughout this province.

We realize the fact that the School Fair and the many other projects that lead up to it have not been thoroughly appreciated as educational factors. They have been made an end and have not been used as a means by which to educate boys and girls. Too often they have been mere spectacular events instead of being intellectualized purposeful activities. On the other hand we should not expect too great a development because, as stated above, the project method is

not generally well understood. As is pointed out by the Director of Agricultural Education for British Columbia, it should be under the direction of thorough-going modern educationists.

The question of more closely linking up the school fair activities with daily school programmes is one of vital importance. There is need, it seems to me, at the present time of setting forth, in as concrete a form as possible, the method of procedure, with the project emphasizing the educational value at each step.

Very few of the school fairs held in this province are held in connection with the county or provincial exhibitions although many pupils enter in the larger competition. We found that when the fair was held as a part of the larger exhibition many an educational opportunity was lost.

The school fairs in this province, for the most part, centre about the school house or community hall and are organized by the teachers and pupils in co-operation with the Agricultural Department. The period for the fairs usually begins with Labour Day and ends about October 12. We plan to have one or more officials from this Department attend the school fair and give whatever assistance they may in judging, pointing out to pupils reasons for their placings, on some occasions presenting prizes and explaining the work in general at the public meeting. Often lessons are taught at the fair.

It is stated clearly in the prize list that all exhibits must be the result of the pupil's own efforts under the supervision of the teacher, and must have been produced during the last preceding year. This plan works very well, especially where the teacher who is conversant with the organization remains in the district from year to year.

However the fact that the work which the pupils have to exhibit was produced in a lower grade and is often laid aside

and forgotten, along with the difficulties attending the organizing of fairs during the autumn when many teachers have taken up their work in a certain district for the first time and are therefore unfamiliar with what had been done by their predecessor and also the short time in which they have for preparation after the opening of school make it seem preferable that the fair should be held at the end of the term. Under these conditions all pupils would be taking part and competition within a grade could be arranged with a greater degree of

satisfaction. Each pupil would be required to exhibit the result of work carefully planned and systematically carried out during the year.

The Nature Study work, etc., exhibited in June need not be exhibited at the agricultural school fair held in the fall. This might be considered an advantage because it would lessen the judges' duties and help to do away with the large amount of work connected with the management and also the confusion which often prevails on fair day.

"Judging is one of the most important features of the school exhibition. Not only should the integrity of the judges be unquestionable, but they must also have clear ideas as to what should be encouraged in the various competitions. Careless judging causes dissatisfaction and may result in children forming wrong opinions as to the desirable qualities of exhibits. Children should be given every opportunity to question judges and find out the reasons for the placing of awards; and when possible, judging competitions should be held for the benefit of both teachers and pupils."—*School Agriculture and Club Leader, Regina.*

PART IV

Special Contributions, Reports of Agricultural Organizations, Publications and Notes

RURAL CREDIT SYSTEMS, ONTARIO

BY A. G. FARROW, CHAIRMAN, AGRICULTURAL DEVELOPMENT BOARD

Short-term Loans

IN order to establish our short-term system of loan, it is necessary to form a Farm Loan Association, according to the following conditions:—

At least five farmers must make application to have a Farm Loan Association established in their township.

Any person resident in the territory described in the application and actually engaged in farming operations, or agreeing to become so engaged within one year, shall be eligible for membership.

No association shall be deemed to be incorporated until a certificate of incorporation setting forth that all the terms of this Act have been complied with has been issued by the board as hereinafter provided.

(1) The amount of the capital stock of the association shall be fixed by the board and shall be made up as follows:—

- (a) One share of par value of \$100 to be subscribed by each member;
- (b) Shares of par value of \$100 to the extent of one-half of the total amount subscribed by individual members subscribed for by the corporations of local municipalities in the territory for which the association is formed.
- (c) Shares of par value of \$100 each to the extent of one-half of the total amount subscribed by individual members subscribed for by the Government of Ontario.

(2) No association shall be incorporated or carry on business until at least thirty members have subscribed for stock in the association.

Each member shall pay ten per cent of the par value of his stock at the time of subscription and the balance when called upon, and payments by municipal corporations and the Government of Ontario shall be made at the same time and in the same proportions as those of individual members.

The council of any local municipality may in their discretion by by-law subscribe to the stock of any association incorporated under this Act to the extent and upon the terms herein provided, and may pay for the stock subscribed for and take all steps incidental thereto and to the carrying out of the provisions of this Act and may issue debentures of the corporation payable within a period not exceeding ten years, for the amount of such subscription in the manner provided by The Municipal Act, but it shall not be necessary to submit any by-law for the issue of such debentures to the electors qualified to vote on money by-laws nor to observe the other formalities in relation thereto prescribed by The Municipal Act.

In the event of two or more municipalities combining in such subscription, the stock held by them may be held in the joint names of the corporations or severally in such proportions as they

may agree upon, and may be acted upon in such joint or separate manner as they may from time to time agree upon.

Upon receipt of a report from the board that an association is being formed in accordance with this Act, the Treasurer of Ontario, with the approval of the Lieutenant-Governor in Council, may subscribe for shares in accordance with clause (c) of section (1) and all necessary payments shall be made out of the Consolidated Revenue Fund or in bonds or other securities issued or guaranteed by the Province of Ontario.

(1) To represent the stock subscribed and to assist generally in the conduct of the business of the association, two directors shall be appointed by a municipal corporation subscribing, or if more than one municipal corporation is subscribing, one director shall be appointed by each corporation and in every case two directors shall be appointed by the Lieutenant-Governor in Council.

(2) Directors named under this section shall serve for a period of two years or until their successors are appointed.

Shares owned by members may be transferred to other members or purchased by the association only with the approval of the board of directors.

The Secretary-treasurer shall be responsible for all moneys or securities realized by the sale of capital stock and such moneys or securities shall, where not needed for liabilities, be invested in bonds or debentures of or guaranteed by a government or municipality, as may be ordered by the directors with the approval of the board.

The subscribing members shall, at such meeting, from among themselves elect a president, vice-president and one director who, with the directors named by the municipality and the province shall constitute the board of directors. The president, vice-president and the director shall hold office for one year, or until their successors are elected.

The Secretary-treasurer, immediately after the holding of the meeting, shall

advise the board that organization has been completed and shall give the names of officers and directors and make application for a certificate of incorporation.

Upon receipt of such application the board may issue a certificate of incorporation to the association in the name approved and thereupon the association shall be a body corporate and shall for all purposes be deemed to be duly incorporated and may carry on business and exercise all the powers conferred upon it by this Act.

Two of the directors elected by the members and three of the directors appointed by the municipality and the Government shall constitute a quorum of the directors of the association.

No officer or director, except the secretary, shall be paid any salary or fee by the association, other than actual disbursements necessarily made in attending to the business of the association and approved by the directors.

The object of an association incorporated under this Act shall be to promote individual prosperity and agricultural development by securing for members short-term loans for current expenditures.

Any member of an association shall be entitled to apply for a short-term loan for any one or more of the following purposes:—

- (a) Purchase of seed, feed, fertilizer and other supplies;
- (b) Purchase of implements and machinery;
- (c) Purchase of cattle, horses, sheep, pigs and poultry;
- (d) Payment of cost of carrying on any farming, ranching, dairying or other agricultural operations;
- (e) Payment of the cost of preparing land for cultivation;
- (f) Fire or life insurance where required, in the opinion of the directors, as collateral security for a loan made for any of the above mentioned purposes.

No loan to any member shall exceed in amount \$1,000 but an additional loan or loans may be made to a member of an association, provided that the total amount of indebtedness outstanding on account of any member shall not at any time exceed \$1,000.

Any member of an association desiring a loan shall sign an application in the form prescribed, stating the amount required and the purpose for which it is to be used, and agreeing to repay the said loan at a date therein to be named, which shall not be later than the thirty-first day of December next thereafter, together with interest at the rates fixed in accordance with the terms of this Act.

All such applications shall be delivered to the secretary and shall be by him presented to the directors at the next following meeting, and the directors shall determine whether any such application shall be approved, and may approve the same in part or on such terms as they may deem proper, and may demand such security from the applicant as they may think necessary. In the event of the application being approved in part only, or being varied, a new application shall be signed by the applicant in accordance with the approval and the former application cancelled.

When an application has been finally approved by the directors, such approval shall be certified on the application in the form prescribed and shall be signed by the secretary and by the president or vice-president, and a record of all applications approved shall be entered in the minutes of the association. One duplicate or copy thereof shall be delivered to the applicant and another duplicate or copy retained by the association. In the event of the absence from any cause of any such officers, the directors may by resolution authorize any other officer to sign the approval in his stead.

Before any moneys are advanced in pursuance of an approved application, the lender or association may require the borrower to sign a note or notes for the amount of the moneys to be advanced,

and the association shall endorse such note or notes, but the terms of such notes shall not vary in any way from the terms of the approved application or from the provisions of this Act. The secretary is hereby authorized to endorse such notes on behalf of the association.

The rate of interest payable by a borrower on a loan guaranteed by an association shall not exceed seven per cent per annum, and out of the interest paid one-seventh shall be paid to the association for the purposes hereinafter mentioned, which share of interest shall be paid by the lender to the association as soon as the loan and all interest thereon has been received by him and the security given to the lender shall not be surrendered until all such interest charges have been paid.

In the event of a borrower not being able to repay the amount of his loan on or before the thirty-first day of December for reasons which appear to the directors to be justifiable or on account of the loan having been granted for purposes not productive within one year, the directors may, on application of the borrower, authorize a renewal of any portion of the said loan until such further time as may be agreed, but not later than one year next after the maturity of the previous loan. The application for such renewal loan shall be in the same form as for any original loan, except that it shall be stamped with the word "Renewal," and shall be kept distinct from any new application made by the same borrower, but in all other respects the provisions of this Act relating to applications and the endorsements thereof, and the rights and liabilities arising thereunder, shall be applicable to such renewals.

The Board shall have general supervision of all associations incorporated hereunder, and all books and records of any association shall be open at all times to inspection and audit by the board or such other person as may be named by the Lieutenant-Governor in Council.

The moneys received by an association from the share of interest received by it shall be applied:—

- (a) In payment of the necessary expenses of the association;
- (b) In payment of a dividend on the paid-up stock of not more than six per cent per annum;
- (c) In accumulating a reserve which may, in the discretion of the directors, be invested in the same manner as the capital stock; in the event of the dissolution of any association, any accumulated reserve shall be divided amongst the subscribers in proportion to the amount of the capital stock respectively held by them.

Long-term Loans

The Agricultural Development Act provides that the Board may loan money for the following purposes and no other.

- (a) Acquiring land for agricultural purposes;
- (b) The erection of farm buildings essential to production;
- (c) To pay off charges existing against land at the time of acquisition by the borrower under a will or by descent.

These loans can be made at 6 per cent interest to an applicant who can qualify, as follows:—

- (a) That he is a British subject of at least twenty-one years of age and has been resident in Ontario for at least three years;
- (b) That he has had at least three years' experience in farming and has displayed average ability and capacity;
- (c) That he is of good character;
- (d) That he is actually engaged or intends to engage upon the land upon the security of which the loan is to be made.

A loan to any one person shall not exceed \$12,000, and shall not be made for longer period than five years, on security of less than fifty acres of land, and

every loan shall be secured by a first mortgage upon land suitable for agricultural purposes.

Every loan made by this board shall be repayable in equal annual instalments of principal and interest sufficient to discharge the debt at the end of such period as may be agreed upon, but no loan shall be made for more than twenty years, or less than three years. Payments on account of the said loan in addition to those provided for in the mortgage may be made on any date on which an instalment of principal and interest falls due.

An applicant desiring a loan applies to the Agricultural Development Board for an application form. This form is very similar to that used by the different mortgage corporations, in that it calls for a complete legal description of the property against which the loan is required, also particulars as to the purpose of the loans. It calls for particulars regarding the applicant, the nature of the farm, his buildings, his stock and implements. In other words, information which enables the board to form a reasonably accurate idea as to whether or not the applicant should be, with the assistance of a loan from this department, in a position to proceed with his farming operations successfully. Providing that the application is proper, the board has the property inspected by one of their valuers, who also makes detailed inquiry into the character and ability of the applicant. This will be attached to the application form for consideration by the board, and, in cases where desired, the applicant appears before the board. The case is considered by the board, and the applicant notified as to their decision. If favourably considered, mortgage papers are drawn and presented for execution through a solicitor in the community in which the applicant lives. When all legal requirements are completed in this respect, including searching of title of the applicant's property, and everything found to be in order, the money is paid over to the applicant.

ANNUAL AGRICULTURAL STATISTICS IN CANADA

BY ERNEST H. GODFREY, F.S.S., CHIEF, AGRICULTURAL DIVISION, DOMINION BUREAU OF STATISTICS, OTTAWA

CONTINUOUS annual estimates of the areas and production of field crops and of the numbers of farm live stock were begun for Canada in 1908 by what was then known as the Census and Statistics Office, but is now the Dominion Bureau of Statistics. The system at first adopted, and which lasted until 1916, was, starting from the census records as a datum line, to estimate from the returns of crop correspondents the areas sown to field crops each year and the numbers of farm animals in plus or minus percentages of the previous year. The imperfection of this system consisted in the fact that any error in one year became multiplied in each succeeding year and before the time when the next census returns were available, the amount of error might be considerable. This is what actually happened during the decade 1908 to 1917, and when the present Dominion Statistician was appointed in 1915 it was determined to adopt new plans following the recommendations of the Departmental Commission on the Official Statistics of Canada who reported in 1912.

After exhaustive study, the present plans for the annual collection of agri-

cultural statistics were put into force, tentatively in 1917 for the four provinces of Quebec, Saskatchewan, Alberta and British Columbia, and permanently from 1918 for all the nine provinces. These plans consist in the collection under arrangements made between the Dominion and Provincial Governments of annual returns from individual farmers through the agency of the rural school teachers and children, except in British Columbia where the returns are collected direct through the post office. After compilation of the returns received, the totals are estimated proportionately to the number of farmers (in Ontario proportionately to the total areas of cleared land) and are agreed to jointly by both the Dominion and provincial authorities. Thus, not only are the totals arrived at by sounder statistical methods, but their acceptance jointly by the Dominion and Provincial Governments obviates the conflict of official figures which formerly proved so embarrassing.

The following statement shows for 1921 the approximate number of farmers in each province, with the number and percentage of the schedules actually returned for the five years 1917 to 1921:

Province	Number of Farms 1921	Number of Returns					Percentage of Returns				
		1917	1918	1919	1920	1921	1917	1918	1919	1920	1921
P. E. Island.....	13,888	-	7,766	3,770	4,903	4,414	-	55	27	36	32
Nova Scotia.....	46,269	-	20,868	12,136	16,249	16,781	-	38	24	30	36
N. Brunswick.....	35,562	-	13,937	6,643	7,266	5,853	-	46	17	10.5	16
Quebec.....	142,017	28,133	34,894	24,735	19,076	29,374	21	20	17	13	21
Ontario.....	184,337	-	79,968	36,213	31,342	37,870	-	43	19	17	20
Manitoba.....	65,194	-	17,808	10,536	16,738	15,271	-	38	21	33	28
Saskatchewan.....	120,900	35,592	46,089	35,531	35,939	32,060	34	34	34	34.6	27
Alberta.....	86,000	14,444	13,574	4,919	14,454	11,862	21	20	7	21	14
British Columbia.....	14,211	6,886	6,534	7,970	8,694	5,986	46	42.5	58	60	42
Total.....	608,368	-	241,438	142,453	154,661	160,071	-	36	21.5	23	23

THE AGRICULTURAL GAZETTE OF CANADA

In the years 1920 and 1921 for crop areas, and in the year 1921 for farm animals, the returns of the census of 1921 when available will serve to control the annual estimates; and when these results are known it will be possible for the governments concerned to gauge the value of the system applied and to amend it by conference or otherwise in the light of the experience gained.

Meanwhile arrangements are being proceeded with for the collection of the statistics of 1922 on the lines of the four previous years, and the principal object of the present article is to draw the serious attention of readers of the *Gazette* to the plans proposed and to enlist their sympathetic co-operation in obtaining the adhesion of farmers by the filling up of the annual schedule to be issued next June.

With the experience of the Great War, when accurate statistics of all national resources proved of vital importance, it is late in the day to question the necessity for annual agricultural returns; yet from time to time one hears their value questioned by farmers themselves, who sometimes consider that statistics are of value only to grain dealers and other traders who use them to the detriment of the farming interest. It is advisable, therefore, briefly to set forth some of the reasons why sound agricultural statistics are necessary not only for national purposes but also especially for the use of individual farmers.

In the first place no government can be satisfactory which does not take accurate account of the country's national resources. Knowledge of total production in volume and value, of its distribution as between province and province, of its distribution as between crop and crop, is essential to the local Legislatures, the Dominion Parliament, and the administrations they support, for securing an equitable adjustment of national and provincial burdens and a fair apportionment of public moneys devoted to reproductive purposes. In the complex machinery of a civilized democracy

important public discussions necessarily precede new departures in policy. In these discussions economists, bankers, journalists, parliamentarians and publicists of all kinds take their part, and all require accurate statistical information upon which to base conclusions. In no branch is accurate statistical information more necessary than in that of agriculture, the very basis of individual and national existence. But if the classes named require agricultural information at the hands of those best qualified to give it, viz., the practical farmers of the country, these themselves are by no means the last to require and to derive benefit from agricultural statistics. In the absence of such statistics, farmers can only grope their way in the dark and be at the mercy of those who exploit ignorance.

Let us take concrete instances. In 1921 there was a glut of potatoes, caused by first an abundant harvest in 1920 upon an increased area following dearth in previous years, and secondly a mild winter reducing wastage to a minimum. The annual statistics showed just what the acreage and yield were and how distributed by provinces. Without such information all concerned in the cultivation and marketing of potatoes would have been working in the dark or at best only by guess work. The statistics of 1921 show a falling off in the area sown to flax of some 895,000 acres, or 37 per cent, the reduction doubtless being mainly due to the fall in price. The acreage is now much below the average, and international statistics show similar reductions in other countries. The intelligent farmer will watch this situation and be prepared to anticipate and benefit from the recovery in price when demand shall overtake supply. At the present time farmers in the West are being advised to sow more rye, and the advantages of fall-sown rye are being especially advocated. The annual statistics measure the progress that is being made in this direction, and it is significant that for 1921 the area reported as under rye has in-

creased from 649,654 acres to 1,842,498 acres. Last year the average yield per acre of hay and clover was the lowest on record—a fact statistically ascertained—and the total yield was only 11,866,100 tons, as against 16,848,000 tons, the record crop of 1919. The timely publication of facts of this kind enable dealers and exporters to regulate their business, and the farmer being dependent upon the merchant for the disposal of his surplus is equally interested. By the publication of agricultural statistics the farmer is placed on a level with the merchant in the market place and is in a better position to secure a fair deal.

In the absence of statistics of total production, the individual farmer is decidedly handicapped, for whilst the dealer knows what supplies are coming forward in bulk the farmer knows only his own production, which if above average may mislead him into thinking that the total production of his province or country may also be over average, when the contrary may be the case. It is the total which rules the price, and knowledge of this total is essential to good business. In the case of wheat, the price is set by world conditions, and it is of vital importance to Canadian agriculturists—and therefore the Canadian individual farmer—to have accurate knowledge of the production of other countries. With the elimination of the great Russian Empire—formerly the world's largest wheat-producing unit—Canada is become the third largest wheat-growing and the second largest wheat-exporting country, and this although the population does not exceed about 8½ millions. It is only through international statistics towards which Canada contributes her share, that the recent great fall in the price of wheat can be understood. The wheat crops of the world in 1921 have proved generally excellent, the northern hemisphere alone having a yield over 5 per cent above that of 1920, and above the average of the five years 1915-19. Great Britain and France have the largest yields of wheat per acre on

record. This means that the importing countries will not require so much wheat as usual, and necessarily the price for wheat from the exporting countries has fallen as a consequence of the more abundant supply in prospect.

Summarizing briefly the reasons why accurate statistics are valuable and even indispensable to farmers themselves, we conclude as follows: Farmers are vitally interested in knowing the trend of agricultural production; so that they may understand better how to regulate their own course of cultivation and stock raising. They occasionally require financial credit from their bankers, who will not extend credit without knowledge of the security afforded by crop prospects and crop yields. The provincial Legislatures, the Dominion Parliament, and the administrations they respectively place in power require accurate knowledge of the country's general resources in order to hold the balance fairly between all classes. The trading classes who market the products of the farmer must be accurately informed of conditions; so that they may sell to the best advantage in the interest of the farmer as well as of their own. Business men make constant inquiries as to profitable openings for their enterprises. These can only be satisfactorily ascertained by accurate knowledge of local production. It is to the interest of the farmer that profitable commercial enterprises should be established in his locality. Finally, agricultural statistics furnished on the highest trustworthy authority prevent or counteract the mischief done by inaccurate statements issued from interested motives.

The Dominion and Provincial Governments of Canada at considerable expense have inaugurated plans for the annual collection of agricultural returns upon methods that are statistically sound, but which depend upon the active co-operation of the farmers of Canada for the degree of accuracy to which they may attain. For those farmers who fail to fill up and return the simple schedule

THE AGRICULTURAL GAZETTE OF CANADA

annually issued to them, resort to estimation is necessary, and therefore it is these defaulting farmers who must be held responsible for inaccuracy in the totals published. In a paper on "Agricultural Statistics: Their Collection and Use," read before Section M of the British Association on the occasion of its meeting at Edinburgh, Scotland, on September 12 last, by Sir Henry Rew, K.C.B., who, until lately, was responsible for the agricultural statistics of the English Ministry of Agriculture, it is pointed out that the present admirable annual agricultural statistics of the Mother

Country originated in respect of acreage and live stock returns in 1866 and in respect of produce in 1885. The returns annually required from farmers were voluntary until under the stress of the Great War they were made compulsory by the Corn Production Act of 1917. Under the voluntary system, however, returns were received from all but about 3 per cent of the farmers of Great Britain. It is to be hoped that the annual agricultural statistics of Canada collected on similar principles may ultimately attain to an equal degree of perfection.

AGRICULTURAL PRODUCTION OF CANADA IN 1921

BY ERNEST H. GODFREY, F.S.S., CHIEF, AGRICULTURAL DIVISION, DOMINION BUREAU OF STATISTICS, OTTAWA

THE agricultural season of 1921 will be remembered for an extraordinary and prolonged drought, which prevailed in most countries of the northern hemisphere. Notwithstanding this, however, Great Britain and France produced excellent wheat crops with average yields per acre the highest on record in both countries. In Canada the wheat crop on the whole proved fair, although the yield per acre for the Dominion was less than in 1920 and was below the decennial average. Threatened disaster, due to the prevailing drought, was averted by heavy rains which fell over most of the province of Saskatchewan in June, giving abundant moisture when most needed. In September, when fine weather is usual, heavy rains in the same province, whilst the grain was in stook, prevented threshing and lowered both yield and grade; but the average turned out to be superior to that of 1920 by $2\frac{1}{2}$ bushels per acre, and the total yield of wheat for Saskatchewan, as finally estimated, was 188,000,000 bushels, as compared with 113,135,000 bushels in 1920. This was the highest

total for Saskatchewan since 1915. In most of the provinces the grain yield was seriously affected by the drought, whilst the average yield per acre of hay and clover for Canada, only slightly over one ton, is the lowest on record. As usual during a hot season, corn proved exceptionally fine, and wherever ensilage is practised farmers were able to fill their silos with fodder corn, which will largely compensate for the scarcity of hay. Fortunately the drought was broken during September in time for the rains to prove of some benefit to late potatoes, to root crops and to pastures upon which, owing to the absence of frost, cattle were able to graze up to a later date than usual.

Areas and Yields of Crops

According to estimates published at the end of November, the area sown to wheat in Canada for 1921 was 23,261,224 acres, as compared with 18,232,374 acres in 1920. These figures were published under reserve; they are based upon actual returns collected from about a quarter of the farmers of Canada, and in

THE AGRICULTURAL GAZETTE OF CANADA

arriving at the total, preliminary census data showing the total number of farms were partially applied. Consequently the figures are not exactly comparable with those of 1920, because the difference is partly due to actual change and partly to correction of data. The actual increase in the wheat area is estimated at over 3,000,000 acres, and represents to some extent a recovery from the de-

crease in 1920, occasioned by the exceptionally late seeding season of that year.

Subject to final correction when the census returns of 1921 shall have become available, the following table shows the areas and yields of all the principal field crops for 1921, as compared with 1920, as well as the average yields per acre for the decennial period 1911 to 1920:—

Field crops	1920	1921	1920	1921	1920	1921	10 year average 1911-20
	acres	acres	bush.	bush.	bush. per acre	bush. per acre	bush. per acre
Spring wheat.....	17,418,241	22,540,589	243,720,100	285,337,900	14.00	12.75	16.25
Fall wheat.....	814,133	720,635	19,469,200	15,520,200	24.00	21.50	23.00
All wheat.....	18,232,374	23,261,224	263,189,300	300,858,100	14.50	13.00	16.50
Oats.....	15,849,928	16,949,029	530,709,700	426,232,900	33.50	25.25	33.75
Barley.....	2,551,919	2,795,665	63,310,550	59,709,100	24.75	21.25	25.75
Rye.....	649,654	1,842,498	11,306,400	21,455,260	17.50	11.75	16.50
Peas.....	186,348	192,749	3,528,100	2,769,981	19.00	14.25	16.50
Beans.....	72,163	62,479	1,265,300	1,089,900	17.50	17.50	16.25
Buckwheat.....	378,476	360,758	8,994,700	8,230,100	23.75	22.75	22.25
Flax.....	1,428,164	533,147	7,997,700	4,111,800	5.60	7.75	9.00
Mixed grains.....	811,634	861,136	32,420,700	22,271,500	40.00	25.75	34.50
Corn for husking.....	291,650	296,866	14,334,800	14,904,000	49.25	50.25	53.75
Potatoes.....	784,544	701,912	133,831,400	107,246,000	170.50	152.75	151.25
Turnips, etc.....	290,286	227,675	116,390,900	79,150,300	401.00	347.75	363.75
			tons	tons	tons per acre	tons per acre	tons per acre
Hay and clover.....	10,379,292	10,614,951	13,338,700	11,366,100	1.30	1.07	1.50
Fodder corn.....	588,977	585,395	5,641,750	6,361,600	9.60	10.75	9.15
Sugar beets.....	36,288	28,367	412,400	268,000	11.37	9.45	9.30
Alfalfa.....	238,556	263,892	583,790	662,200	2.45	2.50	2.45

As shown in the table, the total production of wheat in 1921 is estimated at 300,858,100 bushels, as compared with 263,189,300 bushels in 1920. The crop for 1921 is the largest reported since the great harvest in 1915, when the yield was about 393,500,000 bushels; but the result is due rather to expansion of the acreage sown than to high average yield per acre. Oats show the total of 426,232,900 bushels, as compared with the record of 530,709,700 bushels in 1920. The total area under field crops in 1921

is 59,635,346 acres, as compared with 52,830,865 acres in 1920, but as above indicated the difference is due partly to corrections. Measured both by area and yield, Canada, in spite of her relatively small population, is now the third largest wheat-producing country in the world.

The following statement shows for 1921 the area and yield of the principal grain crops, divided as between Eastern Canada, the Prairie Provinces and British Columbia:—

Crops	Eastern Canada		Prairie Provinces		British Columbia		Total for Canada	
	000 acres	000 bush.	000 acres	000 bush.	000 acres	000 bush.	000 acres	000 bush.
Wheat.....	1,034	19,581	22,181	280,098	46	1,179	23,261	300,858
Oats.....	6,073	139,330	10,820	284,147	56	2,756	16,949	426,233
Barley.....	678	14,720	2,109	44,682	9	307	2,296	59,709
Rye.....	148	2,219	1,688	19,110	6	126	1,842	21,455
Flaxseed.....	16	166	517	3,946	.....	.....	533	4,112

THE AGRICULTURAL GAZETTE OF CANADA

The Potato Harvest

On the whole the potato harvest of 1921 turned out well, though it did not equal the great record of 1920. The yield per acre was especially good in the West. It was highest in New Brunswick with 216½ bushels, as compared with 198 bushels last year and 183½ bushels the decennial average. The yield in Quebec was 162½ bushels, as against 185½ bushels last year and 158 bushels the ten-year average. In the other provinces the yields ranged from 93.8 bushels in Ontario, where the drought was most severely felt, to 176½ bushels in Saskatchewan and 176 bushels in British Columbia. The area planted was somewhat less

than last year, being 701,912 acres, as against 784,544 acres, and the total yield for Canada in 1921 is 107,246,000 bushels, as against 133,831,400 bushels in 1920 and 101,388,300 bushels, the annual average for the five years 1916-1920. With anything like an average keeping season, the supply should prove ample for the needs of consumers until next year's harvest.

Value of Field Crops, 1921

Below is the final estimate of the value of the field crops of Canada for the year 1921, as compared with the two preceding years 1919 and 1920:—

Field Crops	1919		1920		1921	
	Per bush.	Total Value	Per bush.	Total Value	Per bush.	Total Value
	\$	\$	\$	\$	\$	\$
Wheat.....	2.37	457,722,000	1.62	427,357,300	0.81	242,936,000
Oats.....	0.80	317,097,000	0.53	280,115,400	0.34	146,395,300
Barley.....	1.23	69,330,300	0.83	52,821,400	0.47	28,254,150
Rye.....	1.40	14,240,000	1.33	15,085,650	0.72	15,399,300
Peas.....	2.86	9,739,300	2.42	8,534,300	1.96	5,439,400
Beans.....	4.48	6,214,800	3.88	4,918,100	2.90	3,155,800
Buckwheat.....	1.50	15,831,000	1.28	11,512,500	0.89	7,285,100
Mixed grains.....	1.36	37,775,400	0.90	29,236,200	0.62	13,901,220
Flax.....	4.13	22,609,500	1.94	15,502,200	1.44	5,938,400
Corn for husking.....	1.30	22,080,000	1.16	16,593,400	0.83	12,317,000
Potatoes.....	0.95	118,894,200	0.97	129,803,300	0.77	82,147,600
Turnips, etc.....	0.50	54,958,700	0.41	48,212,700	0.34	26,620,400
	per ton		per ton		per ton	
Hay and clover.....	20.72	338,713,200	26.10	348,166,200	23.56	267,764,200
Grain hay.....	29.00	4,379,000	33.12	4,518,000	11.23	14,476,000
Alfalfa.....	21.85	10,800,200	23.79	13,887,700	19.95	13,211,000
Fodder corn.....	6.92	34,179,500	7.75	43,701,000	7.05	44,880,800
Sugar beets.....	10.86	2,606,000	12.80	5,278,700	6.50	1,742,000
Total.....		1,537,170,100		1,455,244,050		931,863,670

By provinces, the total value for the same years is as follows:—

Province	1919	1920	1921
	\$	\$	\$
Prince Edward Island.....	22,367,400	18,530,400	14,202,970
Nova Scotia.....	63,357,000	47,846,550	29,556,400
New Brunswick.....	53,134,400	46,357,300	38,325,400
Quebec.....	309,963,000	330,251,000	219,154,000
Ontario.....	383,573,900	375,746,900	239,627,400
Manitoba.....	182,097,200	133,989,900	72,135,500
Saskatchewan.....	340,029,800	271,213,000	215,635,000
Alberta.....	158,044,400	204,291,500	82,780,000
British Columbia.....	24,603,000	27,017,500	20,447,000
Total.....	1,537,170,100	1,455,244,050	931,863,670

In general the unit prices for all descriptions are considerably less for 1921 than they were for either of the two preceding years; in fact for wheat the price per bushel for 1921 is only 6 cents above the pre-war average 1910-14, whilst for oats and barley the prices per bushel are somewhat less.

Wheat for the whole of Canada averages 81 cents per bushel, as against \$1.62 in 1920; oats are 34 cents as against 53 cents and barley is 47 cents, as against 83 cents. Other grain prices have similarly fallen. The average for potatoes is

77 cents per bushel as against 97 cents in 1920 and 95 cents in 1919. The price for hay and clover, viz., \$23.56 per ton, compares with \$26.10 in 1920 and \$20.72 in 1919, but the low yield per acre, causes the total value to be over \$80,000,000 less than in 1920.

Farm Live Stock

The following table shows the total number of horses, cattle, sheep, swine and poultry, estimated from the returns of June, 1921, as compared with each of the three previous years:—

Description	1918	1919	1920	1921
	No.	No.	No.	No.
Horses.....	3,609,257	3,667,369	3,400,352	3,813,921
Mules.....	10,261	15,102	9,055	10,424
Milch Cows.....	3,538,600	3,548,437	3,504,692	3,736,832
Other Cattle.....	6,507,267	6,536,574	6,067,504	6,469,373
Total Cattle.....	10,045,867	10,085,011	9,572,196	10,206,205
Sheep.....	3,052,748	3,421,958	3,720,783	3,675,860
Swine.....	4,289,682	4,040,070	3,516,678	3,904,895
Poultry—				
Hens.....	31,334,498	31,785,722	25,942,105	34,340,474
Turkeys.....	1,061,982	839,711 ¹	791,766 ¹	1,199,494
Geese.....	879,177	802,869 ¹	754,455 ¹	880,014
Ducks.....	884,034	777,692 ¹	617,638 ¹	762,135
Total Poultry.....	34,159,691	34,645,238 ²	30,505,819 ³	37,182,117

¹ Not including Alberta.
of all kinds in Alberta.

² Including 439,244 other than hens in Alberta.

³ Including 2,399,855 poultry

The total number of horses in 1921 was 3,813,921 as compared with 3,400,352 in 1920. Mules numbered 10,424, as against 9,055. Cattle numbered 10,206,205, as against 9,572,196; sheep, 3,675,860, as against 3,720,783, and swine, 3,904,895, as against 3,516,678. All descriptions have, therefore, increased since last year, excepting sheep, which for the first time since 1917 show a decrease, this amounting to 44,923. Poultry show large increases as compared with 1920, hens from 25,942,105 to 34,340,474; turkeys from 791,766 to 1,199,494; geese from 754,455 to 880,014, and ducks from 617,638 to 762,135. By provinces, horses have increased in the Prairie Provinces and in British Columbia, but show a decrease in the remaining provinces. Cattle have increased in all parts, except the Maritime Provinces

and Quebec. Sheep show a decrease, except in Prince Edward Island, Saskatchewan, Alberta and British Columbia, where there is an increase. Swine show a decrease in the Maritime Provinces, Ontario and British Columbia, and an increase in the other provinces. Poultry show an increase, except only in Nova Scotia and New Brunswick. As in the case of field crops, the differences are due partly to correction by census data and partly to actual change.

Great attention is now being paid to poultry raising and the production of eggs, for which a remunerative market is assured, especially during the winter. According to official calculations the production of eggs in Canada during the year 1921 was about 161,971,000 dozen from 34,340,474 farm hens, as compared with 121,604,000 dozen from 25,942,105 hens in 1920.

THE AGRICULTURAL GAZETTE OF CANADA

The total value of the farm live stock of Canada in 1921 (horses, cattle, sheep and swine) is estimated at \$766,720,000, as compared with \$1,041,246,000 in 1920. The total for 1921 comprises \$314,764,000 for horses; \$190,157,000 for milch cows; \$183,649,000 for other cattle; \$23,308,000 for sheep; and \$54,842,000 for swine. The value of farm poultry is placed at \$38,007,000, as compared with \$37,016,000 in 1920.

Area Under Pasture in Canada

The following are estimates, subject to correction for the years 1920 and 1921 by the census data when available, of the areas under pasture in seven of the provinces of Canada, the estimate being derived from the schedules annually collected by the Dominion Bureau of Statistics, in co-operation with the provincial Governments:—

Province	1918	1919	1920	1921
	acres	acres	acres	acres
Prince Edward Island.....	217,927	233,982	247,360	250,098
Nova Scotia.....	1,199,091	1,177,099	1,075,827	955,030
New Brunswick.....	610,799	723,972	663,012	613,030
Quebec.....	4,764,548	3,893,777	3,869,696	4,016,725
Ontario.....	3,561,754	3,499,802	3,432,620	3,401,998
Saskatchewan.....	933,862	831,592	784,234	678,815
British Columbia.....	45,000	61,220	61,942	61,508
Total for the seven provinces.....	11,332,981	10,421,444	10,134,691	9,977,204

In addition, "range pasture" in British Columbia was estimated at 891,249 acres in 1921, as compared with 847,720 acres in 1920.

Dairying in Canada, 1920

In 1920 there were altogether 3,161 dairy factories, manufacturing butter, cheese and other products. The total production of creamery butter in 1920 was 111,691,718 pounds, as compared with 103,890,707 pounds in 1919, of factory cheese 149,201,856 pounds, as compared with 166,421,871 pounds in 1919. The total value of the dairy factory products in 1920 was \$149,336,491, as against \$135,196,602 in 1919, the items for 1920 comprising \$63,625,203 for butter, \$39,100,872 for cheese and \$43,610,416 for miscellaneous products. Quebec and Ontario continue to be the great dairying provinces of the Dominion, but steady and satisfactory progress is being made in the dairying industry in the West. Quebec and Ontario together produce 70 per cent of the total creamery butter and 97 per cent of the total of factory cheese. These figures do not include the large amount of dairy or

home-made butter, estimated at 125,000,000 pounds for 1920 and the small amount of home-made cheese (1,363,261 pounds in 1910).

Miscellaneous

The commercial production of apples in 1920 amounted to 3,404,340 barrels of the value of \$29,849,149 as against 3,334,660 barrels, value \$24,396,210, in 1919. Nursery fruit stock sold showed also a gratifying increase, the value being \$500,167 for the year ended September 30, 1920, as against \$270,818 in 1919. Tobacco in 1921 occupied about 11,800 acres, as against 53,000 acres in 1920, Ontario growing about 6,500 acres and Quebec about 5,300 acres, the decrease being attributed to the fall in price. The same cause accounts for a decrease in the area sown to fibre flax, which has fallen from 31,000 acres in 1920 to 6,515 acres in 1921. Of maple sugar, the production in Quebec in 1921 was 12,228,514 pounds, as against 15,615,161 pounds in 1920, and of maple syrup 1,375,635 gallons, as against 1,444,649 gallons in 1920. The production in Quebec represents all but about 5 per cent of the total for Canada.

Total Value of Agricultural Production, 1921

Using the data available, the following are rough calculations of the gross value of the agricultural production of Canada for the year 1921: Field crops \$931,863,670, as compared with \$1,455,244,050 in 1920; revenue from farm ani-

mals, including wool, \$101,475,000, as against \$145,404,000; dairy products \$260,000,000, as against \$260,337,000; fruit and vegetables \$40,000,000, for both years; poultry and eggs \$75,000,000, as against \$65,000,000; miscellaneous \$8,000,000; as against \$23,000,000, making the total \$1,416,339,000 for 1921 as against \$1,988,985,000 for 1920.

ROYAL AGRICULTURAL WINTER FAIR ASSOCIATION OF CANADA

Royal Winter Fair Assured for 1922

BY C. F. BAILEY, MANAGING DIRECTOR

READERS of the *Agricultural Gazette* will no doubt recall the unfortunate circumstances which finally brought about the cancellation of the Royal Winter Fair last October. The city of Toronto entered into an agreement with the Royal Winter Fair Association early in June of last year to construct, heat, light and equip a building costing upwards of \$1,000,000 which was to be the home of the Royal Winter Fair. The association, on the other hand, agreed to pay to the city \$40,000 annually toward capital account and \$10,000 annually for rental for a period of ten years. The construction of this building, which contains 8½ acres of floor space with an arena seating upwards of 7,000 people, was started on the 9th of June and completed by the 10th of November. It must be admitted that this was a remarkable performance, especially in view of conditions and the size of the building. However, the question of heat and equipment was not seriously considered by the city until September and it was finally found to be impossible to get any assurance that the building would be ready in time for the dates set for the Royal Winter Fair—namely, November 16 to 24. After careful consideration of the whole question, the executive committee (authorized by the board of directors) finally decided to

cancel the show. In doing this, they fully realized that exhibitors all over the Dominion and in many parts of the United States had been preparing for some months to exhibit at the Royal. These exhibitors were undoubtedly put to a great deal of expense in making preparations and would naturally be very much disappointed. However, it was felt that the prospects for success under prevailing conditions were so doubtful that there seemed to be no other alternative. Subsequent events have fully demonstrated that the executive committee was justified in its action.

I am pleased to say that the Royal Winter Fair executive has succeeded in making a very satisfactory adjustment with the city in that the city has agreed—

- (1) To have the ten-year contract with the association date from 1922 instead of 1921;
- (2) To credit the association with \$15,000 on its first annual payment to the city in lieu of the expenses incurred by the association during the past year, and
- (3) To do everything that can reasonably be done to have the building properly equipped.

THE AGRICULTURAL GAZETTE OF CANADA

The executive committee has also been assured that the city is behind the Royal Winter Fair and prepared to assist in every possible way to make it a success.

In view of the fact that the association has made such a satisfactory ar-

rangement with the city, the Royal Winter Fair in 1922 is assured and it now behooves the agricultural interests to co-operate financially and otherwise in making it fill a very important place in the agricultural development of Canada.

NEWS ITEMS AND NOTES

Dr. A. E. Watson, Chief Animal Pathologist, Health of Animals Branch of the Dominion Department of Agriculture, has returned from Labrador and Norway, where he investigated the reindeer industry, looking to the importation of reindeer into Canada.

The volume of seed testing required to be done by the Seed Branch at Ottawa, has led to the opening of a Dominion Seed Laboratory in Toronto. Suitable equipment has been installed and testing has already commenced in the General Post Office Building at 36 Adelaide St. East. Not only will the congestion at the Ottawa Seed Laboratory be relieved, but convenient and prompt service can thus be given to the large wholesale exporting seed trade centering in Toronto. This laboratory will be so organized and staffed as to give service for the whole Western Ontario inspection district.

The Dominion Fruit Commissioner, Mr. C. W. Baxter, attended the Markets Conference held at Guelph in January last and gave a talk on Grading and Standardizing. Mr. Baxter was also present at the Nova Scotia Fruit Growers' annual gathering, which, he says, is reported to have been the best in the history of the Association. The fruit growers having had three good years in succession are in an optimistic frame of mind.

At the recent meetings of the Entomological Society of America, held in Toronto in affiliation with the American Association for the Advancement of Science, Mr. Arthur Gibson, Dominion Entomologist, was elected president of the Entomological Society of America.

The European Corn Borer, a recently imported and serious pest in southwestern Ontario, is reported to have increased 300 per cent in numbers in the last two years. In 1921 it absolutely ruined numerous fields of early sweet corn and in one district caused a loss of 70 per cent in fields of Flint corn. The Entomological Branch of the Dominion Department of Agriculture is organizing a community experiment to test recommended methods of control.

The third general conference of the staff of the Entomological Branch of the Dominion Department of Agriculture was held at Ottawa in January. The various activities of the Branch were brought under review, and a general discussion took place on the relation of insects to plant diseases, special emphasis being laid on the relation of the leaf-hopper to tip burn of potatoes, and aphids to mosaic disease and yellows of raspberries, and the death of balsam following spruce bud-worm injury. It was felt that as a result of this meeting there should be more co-operative work between entomologists and phyto-pathologists.

The conference as a whole was decidedly successful and it is anticipated that much benefit will follow as a result of the various officers having an opportunity to express and exchange their ideas and opinions.

From reports received by the Dominion Entomologist, it would appear that the codling moth situation in British Columbia is becoming more serious, and that hereafter growers will have to take an active part in control measures in the affected districts.

The Dominion Entomologist reports that after very thorough inspection of the city of St. John, N.B., and a certain section of Queens county, N.S., where outbreaks of the gipsy moth were reported, no moths or egg clusters were detected.

THE AGRICULTURAL GAZETTE OF CANADA

The Brown Tail Moth scouting work in the province of New Brunswick was completed by the end of January without the discovery of any winter nests of this insect. In Nova Scotia, however, 757 nests were collected, the majority of these being found in the Bridgetown, Round Hill and Torbrook districts. Local outbreaks have occurred at the above points during the past five years.

The new Dairy Building at the Ontario Agricultural College will be equipped with the most modern and best dairy appliances for investigation and instruction work. In addition to an increased dairy staff, the sciences of dairy chemistry and bacteriology will be looked after by men devoting their whole time to these subjects. The positions of Dairy Chemist and Dairy Bacteriologist have been assigned respectively to Mr. A. L. Gibson and Mr. T. H. Lund of the Chemistry and Bacteriology departments.

The Department of Farm Management at the Ontario Agricultural College is planning investigations into marketing problems. The initial step in this direction has been the appointment to the staff of Mr. R. D. Colquette (1915) who has studied co-operative marketing both on this continent and in Europe. It is likely that the marketing of dairy products will first be given attention, with extension eventually to all kinds of farm produce. Mr. Colquette will be given a professorship, but the precise title has not yet been determined.

The growth of the Boys' and Girls' Club movement in the United States and Canada has been almost phenomenal and the work is still in its beginnings. It is interesting to note that the movement has spread to Great Britain. The first club in England was formed at Henyodk in Devonshire, and more recently, clubs have been formed at Kingsclere, Newbury, in Hampshire, and at Welwyn, Hertfordshire.

A report recently given out by the Dairy Commissioner of Saskatchewan shows that during the year 1921 there were fifty-five creameries in operation in the province and the total output of creamery butter from these was 7,085,000 lb. with value of \$2,609,000. 1921 was the first year the creamery output of Saskatchewan reached the seven million mark, and above figures show an increase of nearly 7 per cent over 1920. There was also an increase of nearly 50,000 milk cows in the province, and the total value of dairy products was more than eighteen and three-quarter million dollars. This is a very considerable drop in value from total products of the previous year, but this is reported as due to a decrease in the average market values which have obtained for dairy products during the year and not to a decrease in production.

The Saskatchewan Rural Education Association, of which there are now 175 branches in active operation, continues to be the most efficient organization to carry the school exhibition and Boys' and Girls' Clubs. These activities are now recognized as the most important departments of the Rural Education Association.

The Saskatchewan Live Stock Associations instituted a new feature this year in connection with their annual meetings in holding a Boys' and Girls' Stock Judging Contest covering the judging of all classes of live stock. The No. 1 team from Indian Head captured the grand aggregate silver shield presented by the Bank of Montreal. In addition each boy received a gold medal.

A special train under the auspices of the Provincial Department of Agriculture, will tour Alberta in an effort to stir up greater interest in hog industry and especially in the bacon hog. The train will be equipped to demonstrate dairying, bacon, hog production and other branches of agriculture.

ASSOCIATIONS AND SOCIETIES

CENTRAL CANADA VETERINARY ASSOCIATION

At the annual meeting of the Central Canada Veterinary Association the following officers were appointed for the ensuing year: Honorary presidents: Drs. J. G. Rutherford and F. Torrance, Ottawa, C. D. McGilvray, Toronto, and D. McAlpine, Brockville; president, Dr. George Hilton, Ottawa; vice-president, Dr. J. A. Bean, Winchester; honorary patron, Hon. W. R. Motherwell, Minister of Agriculture; honorary members, Drs. J. A. Amyot, Deputy Minister, Department of Health; W. J. R. Fowler, Toronto, Hon. S. F. Tolmie, British Columbia; A. J. C. Hood, Food Inspector, Montreal; George A. Dauth, principal Laval Veterinary School, Montreal; and Rev. J. A. Lindsay, Ottawa; secretary-treasurer, Dr. C. H. Weaver, Ottawa.

BRITISH COLUMBIA FRUIT GROWERS' ASSOCIATION

The British Columbia Fruit Growers' Association's Convention was held in Victoria in January. The association recommended the establishment by the Dominion government of an experimental station in southwest Kootenay, and that stations also be established for experimenting with and testing fertilizers. Among the more important matters dealt with were the codling moth danger and the tariff on imported fruit.

C. E. Barnes, Wallachin, was re-elected president, and Professor Barss, of the University of British Columbia, Vancouver, secretary-treasurer.

NOVA SCOTIA FRUIT GROWERS' ASSOCIATION

The 58th annual meeting of the Nova Scotia Fruit Growers' Association was held at Bridgetown in January last and was well attended. Among those in attendance were: W. T. Macoun, Dominion Horticulturist, Ottawa; J. A. Ruddick, Cold Storage Commissioner of Canada; C. W. Baxter, Fruit Commissioner, Ottawa; B. Leslie Emslie, Consulting Agricultural Chemist; Dr. Cumming and Prof. Truman of the Agricultural College, Truro; Prof. W. S. Blair, Experimental Station, Kentville, N.S.; Prof. Geo. E. Sanders and Prof. W. H. Brittain.

The subject of pre-cooling of fall apples before shipping aroused much interest,

resulting in a resolution asking the Dominion and provincial governments to make provision for experimental work.

The following officers were elected for the ensuing year: President, G. H. Vroom, Middleton; vice-president, J. Elliott Smith, Wolfville; secretary, F. W. Foster, Kingston.

NIAGARA PENINSULA FRUIT GROWERS, LIMITED

The Niagara Peninsula Fruit Growers' Association at its annual meeting elected the following officers for 1922: Hon. President, J. P. Bridgeman, Winona, Ont.; President, Arthur Onslow, Niagara-on-the-Lake; Secretary-Treasurer, C. E. Fisher, St. Catharines.

DAIRYMEN'S ASSOCIATION OF WESTERN ONTARIO

The Dairymen's Association of Western Ontario held its 55th annual convention at London, Ont., in January. Resolutions were passed pledging the association's support to any suitable legislation to make cream grading compulsory in Ontario; asking for the exclusion of oleomargarine; endorsing the Dominion Butter-Scoring contest and the market despatches issued by the Dairy and Cold Storage Commissioner; pledging the association's support to any satisfactory system of grading dairy products for export introduced by the Dominion Department; endorsing the federal and provincial campaigns for the elimination of the scrub dairy sire, and seconding departmental effort on behalf of cow-testing. J. N. Allen, Dunnville, Ont., was elected President. Secretary-Treasurer, F. Hems, London.

NOVA SCOTIA DAIRYMEN'S ASSOCIATION

The Nova Scotia Dairymen's Association at its ninth annual convention at Antigonish in January elected the following officers for 1922: President, R. T. Stewart, Scotsburn; Vice-President, John E. Falt, Antigonish; Secretary, W. A. MacKay, Truro.

THE DAIRYMEN'S ASSOCIATION OF EASTERN ONTARIO

At the annual meeting of the above association, held at Ottawa in January last, the following were the officers elected for the year 1922: President, M. N. Empy, Napanee; 1st Vice-President, William Newman, Lorneville; Secretary, T. A. Thompson, Almonte.

Resolutions were passed urging the prohibition of the manufacture and sale of oleomargarine; approving of the Dairy Standards Act; approving of the work of the Department of Agriculture looking to the elimination of scrub and inferior dairy herd sires; recommending that all creameries value butterfat on the cream basis; endorsing Government grading of dairy products for export.

NATIONAL DAIRY COUNCIL

The National Dairy Council of Canada held its annual convention at Winnipeg. Resolutions were passed (1) For revision and reduction in freight and express rates for milk and milk products; (2) Advising against the importation and sale of milk substitutes.

President for 1922, E. H. Stonehouse, Weston, Ont.; Secretary-Treasurer, D'Arcy Scott, Ottawa.

NEW BRUNSWICK FARMERS' AND DAIRYMEN'S ASSOCIATION AND NEW BRUNSWICK DAIRYMEN UNITED

The forty-sixth annual convention of the New Brunswick Farmers' and Dairymen's Association was held at Moncton, N.B., January 17-20, and in conjunction with the session of January 18 was held the third annual convention of the New Brunswick Dairymen United. The Provincial Seed Exhibition and the Cheese and Butter Show were held simultaneously. There was a large attendance at all these gatherings.

President, Thos. W. Riordan, Riordan, Gloucester County; Corresponding Secretary, Alex. J. Doucet, Notre Dame, Kent County.

NOVA SCOTIA FARMERS' ASSOCIATION

At the annual convention of the Nova Scotia Farmers' Association held at Pictou in January, Mr. Walter Churchill, Yarmouth, was elected President for 1922. Secretary, Chas. R. B. Bryan, Truro.

MANITOBA LIVE STOCK ASSOCIATIONS

The Live Stock Associations for the province of Manitoba held their annual convention at Brandon in January and elected the following officers for 1922:—

Cattle Breeders' Association: President, John Strachan, Pope, Man.

Horse Breeders' Association: President, J. W. Reid, Brandon.

Swine Breeders' Association: President, D. W. Agnew, Brandon.

Manitoba Sheep Breeders' Association: President, John Strachan, Pope, Man.

Secretary of the above associations: W. I. Smale, Brandon, Man.

Manitoba Shorthorn Club: President, C. W. McMillan, Newton Siding; Secretary, John Strachan, Pope.

BRITISH COLUMBIA POULTRY ASSOCIATION

The following are the officers of the British Columbia Poultry Association for 1922: President, Rev. C. McDiarmid, Victoria; Secretary and Manager, Mrs. E. Mottley, Kamloops; Secretary-Treasurer, J. R. Terry, Victoria.

CANADIAN GUERNSEY BREEDERS

At the annual meeting of the Canadian Guernsey Breeders' Association held at Amherst, N.S., the following officers were elected: President, J. F. Roper; 1st Vice-President, J. A. McSloy; 2nd Vice-President, Alex. McKay; Secretary-Treasurer, H. W. Corning.

MARITIME POULTRY ASSOCIATION

The annual meeting of the Maritime Poultry Association elected the following officers for 1922: President, Samuel McKee, Moncton; Vice-President for N.B., R. P. Allen, Fredericton; Vice-President for N.S., W. A. Seaman, Truro; Vice-President for P.E.I., A. F. Houston, Charlottetown; Secretary-Treasurer, A. Vye Gibson.

MARITIME BEEKEEPERS' ASSOCIATION

At the annual meeting of the Maritime Beekeepers' Association the election of officers resulted as follows: President, J. Artemus Clark, Charlottetown, P.E.I.; Vice-President for N.S., Boyd Johnson, Amherst; Vice-President for N.B., Mr. H. C. Miller, Fredericton; Vice-President for P.E.I., Allen Newson, Charlottetown; Secretary-Treasurer, E. G. Craig, Kentville, N.S.

ONTARIO EXPERIMENTAL UNION

At the forty-third annual meeting of the Ontario Agricultural and Experimental Union held at the Ontario Agricultural College, Guelph, in January, the following officers were elected for 1922: President, J. W. Widdifield, M.P.P., Uxbridge, Ont.; Vice-President, J. Baker, Solina, Ont.; Secretary and Editor, Dr. C. A. Zavitz, O.A.C., Guelph.

Dr. C. A. Zavitz made the following statements in his annual report:—

In co-operative experiments conducted for four years, excellent results have been obtained in the use of the dry formaldehyde treatment for the prevention of oat smut. This is a comparatively simple treatment and one which is likely to be adopted quite generally.

In 1921, crop tests were made with "nitro-bacter soil vaccine," which has been extensively advertised. So far no special advantage has resulted from the use of this material.

Definite methods of eradicating some of the worst weeds in Ontario have been formulated and tested out on numerous farms under the direction of the Experimental Union Committee on Agricultural Botany. The weeds that have received special attention so far have been, perennial sow thistle, bladder campion, wild mustard, twitch grass, and wild oats.

Of the seven varieties of corn recommended by the Ontario Corn Growers' Association, the Golden Glow has given the highest average yield of grain per acre in the co-operative experiments in each of five out of the last six years.

The O. A. C. No. 181 variety of field peas which was originated at the Ontario Agricultural College through hybridization, and which was sent out in the spring of 1921 for the first time, surpassed each of three other leading varieties by about four bushels per acre.

Numerous co-operative experiments with fertilizers and manures on farm crops have been conducted. Commercial fertilizers have given more decided results with turnips, mangels and potatoes than with oats, winter wheat, or even corn.

FIELD HUSBANDRY ASSOCIATION, SASKATCHEWAN

At the annual meeting of the Saskatchewan Field Husbandry Association held at Saskatoon in January the officers elected for 1922 were: President, E. G. Booth, Seamans; 1st Vice-President, M. P. Tullis, Field Crops Commissioner, Regina; Secretary-Treasurer, Professor Manley Champlin, College of Agriculture, Saskatoon. The purpose of this association is to carry on field experimental work in the province. Any farmer interested in this work may enroll as a member and take part in the work. An experiment immediately under way is the growing of crops in rows as a substitute for the summer fallow. The association is also interested in the production and sale of choice seed.

Canadian Sheep Breeders' Association.—At the Annual convention of the Canadian Sheep Breeders' Association, the following officers were elected for 1922: President, H. Follett, Duval, Sask.; Vice-president, J. D. Brien, Ridgetown, Ont.; Secretary-Treasurer, R. W. Wade, Toronto.

Dominion Shorthorn Breeders' Association.—The officers elected for 1922 are as follows:—Honorary President, J. G. Barron, Carberry, Man.; President, H. M. Pettit, Freeman, Ont.; First Vice-President, Hon. Duncan Marshall, Olds, Alta.; Second Vice-president, John Gardhouse, Weston, Ont.; Secretary-Treasurer, Geo. E. Day, Guelph, Ont.

Manitoba Dairy Association.—The annual convention of the Manitoba Dairymen's Association, held at Winnipeg, was attended by delegates and exhibitors from Manitoba, Saskatchewan and Alberta. The exhibit of butter was of a high standard, showing a distinct improvement over the year previous. The judges were C. P. Marker, Calgary, and Geo. H. Barr, Chief, Dairy Division, Ottawa.

The officers for 1922 include, E. Fotheringham, Brandon, Man., President, and L. A. Gibson, Winnipeg, Man., Secretary-treasurer.

Ontario Swine Breeders' Association.—The Ontario Swine Breeders' Association at its annual meeting re-elected its officers for 1922 as follows:—President, M. St. Marie, Leamington; Vice-president, W. F. Wright, Glanworth; Secretary, J. E. Rettie, Department of Agriculture, Toronto.

Ontario Vegetable Growers' Association.—At the annual meeting of the Ontario Vegetable Growers' Association the following officers were elected:—President, G. H. Pood, London, Ont.; Vice-president, W. H. Stewart, Aylmer E., Que.; Secretary-Treasurer, J. Lockie Wilson, Toronto.

Ontario Horticultural Society.—At the annual meeting of the Ontario Horticultural Society held at Toronto resolutions were adopted by the convention urging the passing of a Dominion Registration and Standards Act, and approving the proposed Dominion Horticultural Exhibition.

Officers elected for 1922:—President, Rev. W. M. McKay, Weston; First Vice-president, J. P. Jaffray, Galt; Second Vice-president, J. E. Carter, Guelph; Secretary, J. Lockie Wilson, Toronto.

Canadian Jersey Cattle Club.—President, Gordon Duncan, Todmorden, Ont.; Vice-President, F. E. M. Robinson, Richmond, Que.; Secretary-Treasurer, Bartley Bull, Brampton, Ont.

Saskatchewan Shorthorn Club.—Hon. President, Dean Rutherford, Saskatchewan University; President, R. A. Wright, Drinkwater; Vice-President, V. M. Ross, Regina.

Saskatchewan Clydesdale Breeders Association.—President, Peter A. Taylor, Arcola; Vice-President, Jack Byers, Valjean; Secretary, N. D. Mackenzie, Indian Head.

Saskatchewan Cattle Breeders' Association.—President, R. A. Wright, Drinkwater; Vice-President, W. D. Lyon, Deveron; Secretary, J. G. Robertson, Department of Agriculture, Regina.

Saskatchewan Belgian Club.—President, George Rupp, Lampman; Vice-President, R. Thomas, Grandora; Secretary, E. Hogden, Halbrite.

Saskatchewan Hereford Association.—President, W. N. Catley, Craven; Vice-President, W. S. Shore, Cupar; Secretary, W. H. Harrison, Hyde.

Saskatchewan Horse Breeders' Association.—President, James Dougans, Condie; Vice-President; Geo. Rupp, Lampman; Secretary, J. R. Robertson, Regina.

Saskatchewan Sheep Breeders' Association.—President, G. N. Buffum, Bechard; Vice-President, Olaf Berg, Loreburn; Secretary, J. G. Robertson, Regina.

Saskatchewan Swine Breeders' Association.—President, C. W. Thurston, North Regina; Vice-President, C. M. Learmonth, Regina; secretary, J. G. Robertson, Regina.

APPOINTMENTS AND STAFF CHANGES

Mr. Duncan Marshall, former minister of agriculture for Alberta, has been appointed Commissioner, Dominion Department of Agriculture. Mr. Marshall will make an investigation into the advisability of continuing or amending the Agricultural Instruction Act. He will report as to any changes he may find necessary in the amounts to be paid, methods of calculating such amounts, the scope of the work of the provinces under the act, and similar matters. His appointment also carries with it the commission to inquire into such other agricultural problems as may be necessary and desirable.

Mr. Grant S. Peart, B.S.A., formerly Chief of Seed Markets' Intelligence, has been promoted to the position of Chief of Markets and Fertilizer Division, effective from January 1. In addition to his former duties Mr. Peart will have charge of feed and fertilizer markets reporting and will supervise the administration of the Fertilizers Act, which was transferred to the Seed Branch as from April 1 last.

Mr. J. Sidney Dash, who for the past few months has been investigating certain tobacco diseases for the Tobacco Division of the Experimental Farms Branch, has been appointed Supervising Seed Analyst to the Seed Branch of the Dominion Department of Agriculture.

Mr. R. W. Reek has resigned his position as Assistant to the Dominion Live Stock Commissioner to take charge of the Western Ontario Experimental Farm which is to be established by the Ontario Department of Agriculture at Ridgetown. Mr. Reek was born on a farm in Kent county and is therefore acquainted with local conditions and problems. He graduated from the Ontario Agricultural College about ten years ago and was afterwards in the employ of the Ontario Department of Agriculture for a few years in different capacities, including some time spent in the office in London, England. Returning, he served for some years in Eastern Canada, being in charge of the agricultural work in Prince Edward Island for a few years and then becoming Deputy Minister of Agriculture for New Brunswick for a further period. The latter position he resigned to take the position of Assistant Live Stock Commissioner at Ottawa, which position he held until the present time.

Mr. E. H. Strickland, who since his return from overseas has spent three summers in Alberta combating grasshopper outbreaks, is resigning from the staff of the Entomological Branch to take the position of Professor of Entomology at the University of Alberta, where he will be in a strong position to further the science of entomology in Canada.

THE AGRICULTURAL GAZETTE OF CANADA

Mr. George E. Sanders, who was in charge of the insecticide investigations with headquarters at Annapolis Royal, N.S., has resigned his position on the staff of the Entomological Branch of the Dominion Department of Agriculture to engage in commercial insecticide work.

Mr. James Bremner has recently been appointed Live Stock Superintendent for the province of New Brunswick, succeeding Mr. J. H. King, who has returned to the Moncton office as Agricultural Representative. Mr. Bremner was previously the Agricultural Representative at Chatham and at Moncton.

THE LIBRARY

LIST OF PRINCIPAL ACCESSIONS TO THE
DEPARTMENTAL LIBRARY, INTER-
NATIONAL INSTITUTE BRANCH, DEPART-
MENT OF AGRICULTURE, OTTAWA

The genus Iris, by W. R. Dykes. Cambridge, University Press, 1913. 245 pp. col. plates.

Logements des animaux. Part IV. Basses-cours, chenils, ruchers, magnaneries, par M. Ringelmann. Paris, Librairie agricole de la maison rustique, 1922. 160 pp. il.

Essays on agriculture, by S. D. Babbitt and L. C. Wimberly. Toronto, Doubleday, Page & co. 1921. 349 pp.

The respiratory exchange of animals and man, by August Krogh, Ph.D. New York, Longmans, Green & co. 1916. 173 pp. diagrams. (Monographs on biochemistry, ed. by R. H. A. Plimmer).

The federal system of the Argentine Republic, by L. S. Rowe, Ph.D., LL.D. Washington, Carnegie Institution, 1921. 161 pp. (Pub. 258).

Rubber-content of North American plants, by H. M. Hall and F. L. Long. Washington, Carnegie Institution, 1921. 65 pp. plates. (Pub. 313).

Aeration and air content; the role of oxygen in root activity, by F. E. Clements. Washington, Carnegie Institution, 1921. 183 pp. Bibl. pp. 163-183). (Publication 315.)

Contributions to embryology. Washington, Carnegie Institution, 1921. Vols. X & XII. 103, 364 pp. col. plates. (Publications 275 & 293.)

Leodicidae of the West Indian Region, by A. L. Treadwell. Washington, Carnegie Institution, 1921. 131 pp. il. col. plates. Bibl. pp. 128-9. (Publication 293.)

Index of economic material in documents of the States of the United States; Pennsylvania, 1790-1904. Part II. F to Railroads, by A. R. Hasse. Washington, Carnegie Institution, 1921. 147 pp. (Publication 85.)

Displacement interferometry applied to acoustics and to gravitation, by Carl Barus. Washington, Carnegie Institution, 1921. 149 pp. (Publication 310.)

An introduction to cytology, by L. W. Sharp. N. Y. McGraw-Hill book co. inc. 1921. 452 pp. diagrams. Bibliographies at ends of chapters. (Agricultural and biological publications, ed. by C. V. Piper.)

Darwin & after Darwin, by G. J. Romanes, M.A., LL.D., F.R.S. Chicago, Open court publishing co. 1910-1916. 3 vols. il.

Guide to the study of animal ecology, by C. C. Adams, Ph.D. Toronto, Macmillan co. of Canada, 1913. 183 pp. References at ends of chapters.

The kiln drying of lumber, by H. D. Tie-
mann, M.E., M.F. 3d ed. Montreal, J. B. Lippincott co. 1920. 318 pp. diagrams.

Shantung—Treaties and agreements. Washington, Carnegie endowment for international peace, 1921. 120 pp.

Outer Mongolia—Treaties and agreements. Washington, Carnegie endowment for international peace, 1921. 39 pp.

Manchuria—Treaties and agreements. Washington, Carnegie endowment for international peace, 1921. 220 pp.

Korea—Treaties and endowments. Washington, Carnegie endowment for international peace, 1921. 68 pp.

The limitation of armaments, by Dr. Hans Wehberg. Washington, Carnegie endowment for international peace, 1921. 104 pp.

The Sino-Japanese negotiations of 1915. Washington, Carnegie endowment for international peace, 1921. 76 pp.

Detection of the common food adulterants, by E. M. Bruce; 3d. ed. N.Y. D. Van Nostrand co. 1917. 88 pp.

National education association of the U.S. Addresses and proceedings... Washington, 1921. 883 pp. (Vol. 59.)

Plymouth Rock standard breed book, by A. C. Smith. Chicago, 1919. 438 pp. illus.

The nut culturist, by A. S. Fuller. N.Y. O. Judd co. 1919. 289 pp. il.

Transactions of the first world's poultry congress, 1921. 386, 42 pp.

The new rhubarb culture, by J. E. Morse. N.Y. O. Judd, 1918. 130 pp. il.

Bulbs and tuberous rooted plants, by C. L. Allen. N.Y. O. Judd, 1920. 311 pp. il.

Heredity, by J. A. Thomson, M.A. 2d ed. N.Y. G. P. Putnam's sons, 1913. 627 pp. il.

Fruit farming on the "dry belt" of British Columbia, by J. S. Redmayne, M.A. new and revised edition. London, Times book club, 1912. 132 pp.

The study of the weather, by E. H. Chapman. Cambridge, University Press, 1919. 131 pp. illus.

Building plans for modern homes, by F. H. Gowing. Boston, 1921. unpagged.

Clean milk, by S. D. Belcher, M.D. N.Y. O. Judd co. 1916. 145 pp. illus.

Dwarf fruit trees, by F. A. Waugh. N.Y. O. Judd co. 1920. 125 pp. illus.

Hedges, windbreaks, and live fences, by E. P. Powell. N.Y. O. Judd co. 1918. 140 pp. illus.

Wealth & freedom, by Richard Higgs. Dover, Dover printing and publishing co. 1920. 256 pp.

Silver-fields and other sketches of a farmer-sportsman, by R. E. Robinson. Boston, Houghton Mifflin co. 1921. 261 pp.

Feeds and feeding manual, by E. S. Savage and F. B. Morrison. Milwaukee, Wis. 1921. 167 pp.

Asparagus, by F. M. Hexamer. N.Y. O. Judd co. 1920. 168 pp. il.

Handbook of horticulture & viticulture of Western Australia, by A. Despeissis, M.R. A.C. 3d ed. 647 pp. il.

A day in a colonial home, by Della R. Prescott, ed. by John Cotton Dana. Boston, Marshall Jones co. 1921. 70 pp. il.

Fruit farming; practical and scientific... by Cecil H. Hooper. 2d ed. London, Lockwood press, 1921. 212 pp. illus.

The desert and the rose, by E. N. Ellison. Boston, Cornhill co., 1921. 215 pp. illus.

Canadian grain trade year book, 1920-21. Winnipeg, W. S. Evans statistical service, 1922. 77 pp.

The wheat plant, by John Percival. London, Duckworth, 1921. 463 pp. illus.

Diseases of the small domestic animals, by O. V. Brumley, V.S. N.Y., Lea & Febiger, 1921. 672 pp.

Germination in its electrical aspect, by A. E. Baines. N.Y., E. P. Dutton & co., 1921. 185 pp. il.

Farm management, by R. L. Adams. N.Y., McGraw-Hill co. inc. 1921. 671 pp. il.

La distribution géographique des animaux, par W. L. Trouessart. Paris, Librairie Octave Doin, 1921. 332 pp. il.

Efficient marketing for agriculture, by T. Macklin. Toronto, Macmillan co. of Canada, 1921. 418 pp. il.

Soils, by E. W. Hilgard. Toronto, Macmillan, 1906. 593 pp. il.

The complete garden, by A. D. Taylor, M.S.A. Toronto, Doubleday Page & co., 1921. 440 pp. il.

Studies of a plant-lover, by Elizabeth W. Perry. Cincinnati, Ebbert & Richardson, co., 1921. 400 pp. il.

Raspberry growing in Scotland, by J. M. Hodge. Edinburgh, Scottish small holders' organization, 1921. 120 pp. il.

Parasites végétaux des plantes cultivées, par Louis Mangin. Paris, Librairie agricole de la maison rustique, 1921. 159 pp.

The little garden, by Mrs. Frances King. Boston, Atlantic monthly press, 1921. 94 pp. illus.

A manual of microscopy, by L. K. Darbaker, Ph.D. Pittsburgh, 1920. 215 pp. illus.

THE AGRICULTURAL GAZETTE OF CANADA

The chemist's handbook. Scranton, International textbook co., 1921. 364 pp. illus.

Check list of the plants contained in Gray's manual, by Mary A. Day. Cambridge, 1908. 168 pp.

A manual of histological pharmacognosy and bacteriology, by L. K. Darbaker, Ph.G. Pittsburg, 1921. 506 pp.

Animal and vegetable oils, fats and waxes, by G. Martin, D.Sc. London, Crosby, Lockwood & son, 1920. 218 pp. il.

A research on the eucalypts and their essential oils, by R. T. Baker. Sydney, 1920. 471 pp. illus.

The farm bureau movement, by O. M. Kile. Toronto, Macmillan, 1921. 283 pp. il.

Farm management, by F. W. Card. Toronto, Doubleday, Page & co., 1920. 270 pp. il.

Church co-operation in community life, by P. L. Vogt. N.Y., Abingdon press, 1921. 171 pp.

Rural organization. Washington, American country life association, 1921. 237 pp.

Immigration and the future, by Francis Kellor. N.Y., Doran, 1920. 276 pp.

Community civics, by W. E. Ames, M.A. and Arvie Eldred, B.A. Toronto, Macmillan co., 1921. 387 pp. il.

Sylvan Ontario, by W. H. Muldrew. Toronto, William Briggs, 1901. 67 pp. il.

The one-man poultry plant, by Dr. W. N. Sanborn. Syracuse, Depuy, 1916. 64 pp. il.

Sewing and textiles, by M. L. Matthews. Boston, Little, Brown & co., 1921. 155 pp. il.

The conservation of textiles, by H. G. Elledge and A. L. Wakefield. La Salle, Ill. Laundry owners national association, 1921. 162 p.

The book of cowboys, by F. Rolt-Wheeler. Boston, Lothrop, Lee & Shepard co., 1921. 394 pp. il.

Successful family life on the moderate income, by M. H. Abel. Montreal, J. B. Lippincott co., 1921. 251 pp.

An introduction to social psychology, by William McDougall. Boston, J. W. Luce & co., 1913. 389 pp.

Options and futures, by J. C. McMath. Chicago, G. I. Jones, 1921. 70 pp.

Boy activity projects, by S. A. Blackburn. Peoria, Ill., Manual arts press, 1918. 143 pp.

Trapping, by W. L. Arnold. Guilford, Me., 1921. 51 pp. il.

The Airedale terrier, by E. W. Baker. N.Y., Field & fancy pub. co., 1921. 98 pp. il.

The conservation of the wild life of Canada, by C. Gordon Hewitt, D.Sc. N.Y., Charles Scribner's sons, 1921. 344 pp. il.

Motor truck manual. Cincinnati, American automobile digest, 1921. 148 pp. il.

Federal farm loan system in operation, by A. C. Wiprud. N.Y., Harper & bros., 1921. 280 pp.

Everyday civics, by C. E. Finch. N.Y., American book co., 1921. 326 pp. il.

War government of the British Dominions, by A. B. Keith, D.C.L. N.Y., Humphrey Milford, 1921. 353 pp.

Australia unlimited, by E. J. Brady. Melbourne, George Robertson & co., 1921. 1130 pp. il.

Practical stone masonry self-taught, by F. T. Hodgson. Chicago, F. J. Drake & co., 1907. 486 pp.

Sewers & drains, by A. Marston, C.E. Chicago, American technical society, 1917. 197 pp. il.

Vocational arithmetic for girls, by Mrs. N. S. Davis. Milwaukee, Bruce publishing co., 1920. 137 pp.

Standard poultry for exhibition, by J. H. Robinson. Quincy, Ill. Reliable poultry publishing co., 1921. 176 pp. il.

Molding concrete chimneys, slate and roof tiles, by A. A. Houghton. N.Y., Norman W. Henley publishing co., 1911. 61 pp.

Agricultural bacteriology, by H. L. Russell. N.Y., Century co., 1921. 368 pp. il.

Cement, by Bertram Blount, F.I.C. N.Y., Longmans, Green & co., 1920. 284 pp. il.

Preserving animal and vegetable substances, by M. Appert. Chicago, Glass container association of America, 1920. 113 pp.

THE AGRICULTURAL GAZETTE OF CANADA

A laboratory study of household chemistry, by M. E. Jones. N.Y., Allyn & Bacon, 1921. 173 pp.

The twentieth century book on the horse, by Sydney Galvayne. London, Baillière, Tindall & Cox, 1912. 3d ed. 346 pp. il.

Pigs pigsties and pork, by G. Mayall, M.R.C.V.S. London, Baillière, Tindall & Cox, 1921. 2d ed. 228 pp. il.

Dairy laboratory exercises on testing and composition of dairy products, by H. C. Troy and T. J. McInerney. Ithaca, 1921. 166 pp.

Pets, and how to care for them, by L. S. Crandall. N.Y., Zoological Park, 1921. 303 pp. il.

Veterinary toxicology, by G. D. Lander, D.Sc., F.I.C. London, Baillière, Tindall & Cox, 1912. 312 pp.

Shorthorn breeders' guide. London, Shorthorn breeders' society, 1921. 197 pp. il.

Veterinary hygiene, by R. G. Linton, M.R.C.V.S. Edinburgh, Green & co., 1921. 429 pp. il.

Novo dizionario universale della lingua italiana. Milan, Fratelli Treves, 1915. 2v.

NEW PUBLICATIONS

DOMINION DEPARTMENT OF AGRICULTURE

Report of the Agricultural Instruction Act, 1920-1921.

Report of the Veterinary Director General, F. Torrance, B.A., D.V.Sc., 1920-21.

Report of the Director, E. S. Archibald, B.A., B.S.A., 1920-21.—Dominion Experimental Farms.

Experimental Station, Charlottetown, P.E.I., 1920-21.—Report of the Superintendent, J. A. Clark, B.S.A., Dominion Experimental Farms.

Experimental Sub-Stations, 1920-21.—Beaverlodge, Alta., Fort Vermilion, Grouard, Alta., Fort Smith, N.W.T., Fort Resolution, N.W.T., Swede Creek, Yukon, Salmon Arm, B.C.—Reports of the Experimentalists in Charge. Dominion Experimental Farms.

Experimental Station, Lennoxville, Que., 1920-21.—Report of the Superintendent, J. A. McClary. Dominion Experimental Farms.

Tobacco Division, 1920-21.—Report of the Officer in Charge, F. Charland. Dominion Experimental Farms.

Poultry Experiences at the Experimental Station for Vancouver Island, Sidney, B.C.—By L. Stevenson, B.S.A., M.S., Superintendent. Dominion Experimental Farms. Circular No. 20.

The Manurial Value of Seaweed.—By Frank T. Shutt, D.Sc., Dominion Chemist.—Circular No. 19, Dominion Experimental Farms.

List of Publications, 1922.—Pamphlet No. 1—New Series, Publications Branch.

The Outlook for Dairying and the Marketing of Dairy Produce.—By J. A. Ruddick, Dairy and Cold Storage Commissioner. Pamphlet No. 3—New Series.

Division of Forage Plants., Dominion Experimental Farms.—Report on the Dominion Agrostologist, M. O. Malte, Ph.D., 1921.

Why and How to Use Milk.—By Helen G. Campbell, Dairy and Cold Storage Branch.

ONTARIO

The Fruit Growing Business in the Niagara District.—Part IV Farm Management Series, by E. E. Reilly, B.S.A., Department of Farm Economics, Ontario Agricultural College.

QUEBEC

Report of the Minister of Agriculture of the Province of Quebec, 1920-21.

Quebec Dairymen's Association and Dairy School.—Thirty-ninth Annual Report, 1920. Supplement to the Report of the Minister of Agriculture.

THE AGRICULTURAL GAZETTE OF CANADA

MANITOBA

Silo Construction.—Extension Bulletin No. 62.—By L. J. Smith, B.S., Manitoba Agricultural College, Winnipeg.

Debating Clubs.—Extension Bulletin No. 61.—By Prof. G. A. Sproule, Manitoba Agricultural College.

Dugouts for Water Storage.—Circular No. 61.—By G. L. Shanks, Professor of Agricultural Engineering, Manitoba Agricultural College, Winnipeg.

Feeding for Winter Eggs.—Circular No. 51.—Second Edition.—By M. C. Herner, B.S.A., Professor of Poultry Husbandry, Manitoba Agricultural College.

SASKATCHEWAN

Eleventh Annual Report of the Director of Agricultural Extension, 1920-21.—Contains account of the work of the Agricultural Societies.

Fifteenth Annual Report of the Dairy Commissioner, 1920-21.—With which is published as an appendix the Report of the Twelfth Annual Convention of Saskatchewan Dairy-men.

Report of the Southwestern Saskatchewan Corn Research Project.—Bulletin No. 5, Department of Field Husbandry, College of Agriculture.

BRITISH COLUMBIA

Proceedings of the Entomological Society.—No. 16 Systematic series.

Proceedings of the Entomological Society.—Nos. 13 and 15 Economic Series.

Report of the Director of Elementary Agricultural Education for the Province of British Columbia.—Reprint from Public Schools Report, 1920-21.

MISCELLANEOUS

Fur Farms, 1920.—Issued by the Dominion Bureau of Statistics, Fur Division.

The Canadian Kennel Club Stud Book; Vol. 24.—Containing Registrations and Winnings for the year ending December 31, 1920. Issued by the Canadian Kennel Club.

PART V

The International Institute of Agriculture

FOREIGN AGRICULTURAL INTELLIGENCE

All communications in regard to this section should be addressed to T. K. Doherty,
International Institute Commissioner, Department of Agriculture,
West Block, Ottawa.

CROPS AND CULTIVATION

124.—Damage to Crops by Weather in the United States.—WARREN SMITH J., in *Monthly Weather Review*, Vol. 47, No. 8, pp. 446. Washington, August, 1920.

The following table gives the average damage per cent to crops in the United States due to different factors or unfavourable weather conditions:—

It appears from the data available that the total amount of actual potash imported or produced in the United States in 1920 was approximately the same as in 1913, the actual figures being 240,000 tons in 1920 and 237,437 tons in 1913. In 1920 there were imported 1,480,503 short tons of sodium nitrate as compared to a total of 659,600 short tons

	Deficient Moisture	Excessive Moisture	Floods	Frost or or Cold	Hail	Hot Winds	Storms	Total Weather	Plant Diseases	Insect Pests	Animal Pests	Defective Seed	Total
Wheat.....	12.4	2.0	0.3	4.5	1.1	2.0	0.3	22.9	2.7	2.1	0.2	0.2	28.8
Maize.....	16.3	4.0	0.9	2.9	0.4	2.2	0.5	27.7	0.2	2.7	0.2	0.7	32.1
Oats.....	13.4	2.7	0.3	0.8	0.8	1.9	0.4	20.8	1.7	0.9	0.1	0.2	24.5
Barley.....	17.2	1.8	0.1	0.8	1.3	3.2	0.4	24.9	1.7	0.7	0.3	0.1	28.7
Flax.....	21.1	1.3	0.1	4.0	1.7	3.0	0.2	31.8	2.2	0.9	0.1	0.3	36.4
Rice.....	6.7	3.1	1.3	0.3	.....	0.4	1.8	14.1	1.2	0.8	0.3	0.1	19.0
Potatoes.....	14.4	3.1	0.2	1.6	0.1	0.7	0.1	20.7	4.4	3.2	0.1	0.3	30.0
Tobacco.....	8.7	3.7	0.6	1.1	0.8	0.2	0.3	15.8	0.4	2.6	.....	0.1	30.5
Hay.....	13.4	1.7	0.3	1.7	0.1	0.6	0.2	18.4	0.1	0.5	0.1	0.1	20.4
Apples.....	5.4	1.6	0.2	14.6	0.8	0.5	0.9	24.9	3.7	3.6	0.1	.....	39.6
Berries.....	9.3	1.7	0.2	7.3	0.5	0.6	0.2	20.3	1.1	0.6	0.1	.....	24.9
Cotton.....	12.3	4.3	1.0	1.4	0.5	1.6	0.7	22.3	2.0	9.7	.....	0.2	35.3

125.—Frost and the Prevention of Damage by it.—*Farmer's Bulletin* No. 1096, United States Department of Agriculture, pp. 3-48. Washington, D.C., April, 1920.

A description of the actual effect of frost on soil and vegetation, followed by a discussion of various methods and devices now being used for protection purposes, and the temperatures injurious to plants, blossoms and fruits, with special reference to citrus fruits.

THE FERTILIZER SITUATION.—U.S. Senate, 66 Congress, 3, Sess., Doc. 410 (1921). 27 pp.

This document consists of a letter from the Secretary of Agriculture, transmitting a statement on the fertilizer situation in the United States, in response to a Senate resolution of January 26, 1921. Data are included on the amount of commercial potash, nitrogen, and phosphoric acid available for fertilizer purposes and the price of each of these articles as compared with the prices for 1913.

imported in 1913. The opinion is expressed that in view of the subnormal buying power for the spring season of 1921 the stocks on hand were sufficient for deliveries and contracts for the entire year of 1921.

It is estimated that about 490,000 tons of ammonium sulphate were produced in the United States in 1920, and that considering imports and exports there were about 50,000 tons in the hands of the producers, and about an equal amount of contract material in the hands of the fertilizer manufacturers. The domestic consumption of ammonium sulphate, including domestic production and imports in 1913, is estimated as 260,775 short tons.

A probable production of about 70,000 tons of fish scrap in 1920 is estimated as compared with the 1913 production of 68,705 tons. The amount of cottonseed meal produced in 1920 is estimated to be around 2,288,000 tons, while the amount produced in 1913 was estimated at 2,220,000 tons. It is estimated that in the period from July

1, 1917, to June 30, 1918, about 34.9 per cent of the total tonnage of cottonseed meal and cake produced in the United States was used for fertilizer. No figures were available for the production of animal tankage, dried blood, and similar slaughterhouse products in 1920.

The data available indicate that the production of acid phosphate in 1920 was around 4,500,000 tons as compared with approximately 4,000,000 tons produced in 1913.

The data on prices of fertilizer materials in 1920, as compared with 1913, show that the prices for 1920 were in all cases higher than for 1913. In some cases, notably phosphates and potash, the prices were much higher, but in other cases only slightly so. Suggestions are given for relief of the situation in case the amount of any or all of the materials discussed is insufficient or the price prohibitive.

12.—The Phosphoric Acid in Sandy Humiferous Soils and in their Solutions.—BRIOUX, CH., in the *Annales de la Science Agronomique*, Series 6, 1920, pp. 80-86. Paris, 1920.

In normal, non-acid soils with an average humus content, the phosphoric acid is usually present in the form of tribasic calcium phosphate associated with a small quantity of iron phosphate and alumina; a third part is combined with the black matter of the soil, and as a result of nitrification, is gradually placed at the disposal of the plants in a much divided form that is easily assimilated. On the other hand, the water surrounding the soil particles normally dissolves but very little of the phosphates, so that, as a rule, the solutions circulating in the soil and providing the plants with food, only contain some tenth parts of a milligramme of P_2O_5 per litre, and rarely more than 1 to 2 mgm., even when the soil is very fertile; but the experiments of Th. Schloessing have demonstrated that these small quantities, which are continually renewed, are sufficient to ensure the complete development of maize grown in nutritive solutions.

The phosphoric-acid content of soil solutions is constant for any given soil, and M. Dumont explains its variations in different soils by the variable composition of the humates and humo-phosphates present in them.

This suggestion seems to be borne out by the experimental results obtained by the author, showing that the high P_2O_5 content of the solutions of certain soils is connected with the presence of a large amount of humic matters together with a deficiency in lime.

These experiments were carried out upon humiferous, sandy soils composed of a coarse sand consisting entirely of silica, and which were originally yellowish, but from repeated

manuring, had assumed the blackish hue characterizing humiferous soils. They had an acid reaction, and were very poor in potassium and lime, and very rich in P_2O_5 .

From his experiments, the author draws the following conclusions:—

In the case of sandy, humiferous soils without lime, the phosphoric-acid content of the soil solution appears to depend upon 3 factors, which are, in descending order:—(1) Lime content; (2) amount of black matter; (3) total phosphoric-acid content.

As soon as the lime content falls below 2 per 1,000, the humo-phosphates can begin to dissolve to a noticeable extent in the water surrounding the soil particles.

Sandy humiferous soils enriched by very intensive cultivation are capable of giving solutions containing far more phosphoric acid than is generally recognized, and certain losses of black matter and of phosphoric acid may be due to the action of drainage water.

In order to derive most advantage from such soils, the first thing to do is to add lime, which will precipitate the humus more thoroughly on the particles of sand and will give more stability to the phosphatic compounds. The lime will also promote nitrification and facilitate the double decompositions taking place between the fertilizers and the soil. It is equally necessary to add potash which is usually lacking in this type of soil.

Quick or slaked lime would be too violent in its action, and is best replaced by lime compost and, when possible, by soft chalky lime, more or less finely pounded, as its chemical action is in direct proportion to its fineness. The author obtained excellent results by adding to these sandy, humiferous soils 1,800 lb. of pulverized chalk refuse per acre, together with potassic fertilizers.

131.—Effect of Alfalfa on the Subsequent Yields of Irrigated Field Crops.—SCOFFIELD, C. S., in *United States Department of Agriculture, Bulletin No. 881*, pp. 1-13. Washington, D.C., August 10, 1920.

Report of experiments carried out at 3 different Stations in the northern Great Plains, to ascertain the extent of the beneficial effect of growing alfalfa in rotation with Irish potatoes, oats and sugar beets growing on irrigated land. The trial tests covered a period of 6 years. Comparison is also made between these crop yields when grown in the same sequence but without alfalfa. A further comparison is made in the case of potatoes and sugar beets, as to the relative effect of alfalfa in rotation and the application of farm yard manure at the rate of 12 tons per acre, once during the period of rotation.

Results showed that when the soil is a light sandy loam, the effect of alfalfa has been to increase the yields per acre as follows:—potatoes about 100 bushels, oats about 6 bushels, sugar beets 3-4 tons.

On heavy clay loam rich in organic matter, no beneficial effect was apparent, and the effect on oats and sugar beets was too slight to be regarded as significant.

On a very productive clay loam, the increase in yields per acre showed:—for potatoes about 50 bushels, without, however, increasing the proportion of marketable potatoes, which was relatively high on all the plots, oats about 11 bushels, and sugar beets about 1-5 tons.

While these results do not show a strikingly beneficial effect from the use of alfalfa in the rotation in the case of oat yields, it should be noted that these crops were grown on soil that was virgin at the beginning of the experiment and of relatively high productivity as shown by the mean yields of all the plants included in the experiment. In the case of sugar beets the alfalfa appeared nearly as beneficial as the periodical applications of manure, even although the position of the beet crop in the alfalfa rotation was not so favourable as in the manured rotation. While both manure and alfalfa have increased the yield, the size of the beet, and the vigour of growth as expressed in the larger proportion of tops, there has not been a corresponding increase in the percentage of sugar in the beets.

22.—The Influence of Cold in Stimulating the Growth of Plants.—COVILLE, F. V., in the *Proceedings of the National Academy of Sciences of the United States of America*. Vol. 6, No. 7, pp. 434-435. Easton, Pa., July, 1920.

The author gives contradictory evidence to the general belief that native trees and shrubs become dormant because of the cold, and that warm weather is in itself the sufficient cause of the beginning of new growth in spring.

Dormant trees and shrubs which had had two or three months of chilling, either outside or in artificial cold storage, started into growth in the normal manner in the spring, but if kept warm all the winter they did not start into growth at the usual time but continued their dormant condition for weeks and months, and sometimes for a whole year. When finally growth commenced it was of an abnormal character. One of these dormant plants was found to be readily started into healthy growth even after a year, by subjecting it to a period of chilling. The best temperature for chilling was 32° to 40°F., applied either in light or darkness. By subjecting one part of a dormant bush to a chilling temperature and keeping another

part of it warm, the chilled portion was brought into full leaf and flower while the other part remained completely dormant.

During the process of chilling, the starch stored in the cells is transformed into sugar and this is necessary before the plant can utilize its store of starch in making spring growth. If warmth alone would start growth, the stored food required by the plant for its normal vigorous growth the following spring would be wasted in a burst of new autumn growth, which would be killed by the first heavy frosts and cause ensuing weakness and probable death.

Further investigations are urged, especially in the determinations of the proper temperatures for the storage of different kinds of seed, bulbs, cuttings and grafting wood; for the treatment of plants which are to be forced from dormancy to growth at unusual seasons, and for the storage of nursery stock so that the nurseryman may have plants in proper condition for shipment at any date.

26.—The Nitrogenous Matter and Phosphoric Acid present during the Maturation and Germination of Wheat.—ROUSSEAU, E., and SIROT, in the *Comptes rendus de l'Academie des Sciences*, Vol. CLXXI, pp. 578-580. Paris, September 27, 1920.

In their previous work on the baking qualities of flour the authors have shown that in the flours made from normal, completely ripe and properly harvested wheat, the ratio of the soluble nitrogen to the total nitrogen present is almost constant in good baking flours. In flours that take badly, the proportion of soluble nitrogen varies from this constant.

Subsequently, they estimated the variations in the nitrogen, phosphoric acid and acid contents, not only of the flours but also of the wheat itself. Analyses were made of average samples of wheat gathered every five days in the same field from the setting of the grain until the harvest; and then seeds from the beginning of germination until the emergence of the seedling. The results may be summarized as follows:

The total nitrogen varies little; it increases and then decreases slowly and slightly as the carbohydrates increase. If, however, the percentage of the total nitrogen varies but little, the conditions under which it exists differ greatly. At first, 40% of the nitrogen is soluble, but its solubility gradually decreases till only 9% is soluble. At this point, a fresh slight increase of solubility manifests itself, and 3 or 4 days later, an almost stable condition of equilibrium is reached, the proportion of soluble nitrogen being about 14%. This stable condition appears to coincide with the chemical maturation that appears to precede the harvest

by a fortnight. The ratio of soluble nitrogen to total nitrogen remains about 14%, as long as the condition of the wheat is normal, but should it begin to germinate, the amount of soluble nitrogen rapidly increases rising to 26% in the distended, germinating seed, and to 52% in the embryo itself.

The behaviour of the phosphoric acid is in every way similar to that of the nitrogen; the percentage is at first almost uniform, but falls from 76 to 30% to rise slowly to, and remain at about 35%. In the germinating seed, it increases rapidly to 42%.

The parallelism in the variations of the nitrogen and phosphoric acid is not without practical interest. It is possible to admit a correlation between a scarcity of available nitrogen in soils, and the low gluten content of wheats with a heavy yield, but it appears that this could not be remedied by the increased application of easily nitrifiable nitrogenous fertilizers, unless a large supply of phosphatic manures were given at the same time.

During maturation, the acidity distinctly and regularly falls, declining from 0.300 to 0.016 to rise again to 0.048 in the germinated grain.

To sum up, wheat reaches normal and complete maturity when a state of equilibrium is reached, which as far as the nitrogenous and phosphatic matters are concerned, consists in the existence of a certain ratio between the soluble and insoluble materials. Any other ratios denote insufficient maturation, or a tendency to germination, which means that the condition of the wheat, or the flour, is more or less unsuitable for bread-making.

40.—The Artificial Production of Vigorous Trees by Hybridization.—HENRY, A., in *Quarterly Journal of Forestry*, Vol. XIV, No. 4, pp. 253-257. Bibliography of 6 works. London, Oct., 1920.

For several years the author has been making experiments in the production of new trees by hybridization, in the hope of obtaining fast-growing kinds that would produce timber rapidly. A considerable number of such trees have occurred accidentally, and among them may be mentioned the Lucombe Oak, the Huntingdon Elm, the Black Italian Poplar, the Cricket Bat Willow, and the London Plane. These all show the striking feature of first crosses in the difference of the rate of their growth from that of the parent species. These hybrids of the first generation, in trees as in other plants, are remarkable for their size, rapid growth early and free-flowering, the ease with which they can be multiplied, and in all probability their comparative immunity from disease. Impressed with these

facts, the author urged in 1910 that the artificial production of trees by crossing was a new and important field of research.

It is a popular belief that fast-grown timber is necessarily is soft and comparatively worthless. This a fact in most conifers; but in one class of broad-leaf trees, the wood of which is characterized by large pores in the inner part of the annual ring, the contrary is true, as the faster the timber of these trees is grown the stronger and denser it becomes. This class includes oak, ash, chestnut, hickory and walnut, the species in fact that, par excellence, produce the most valuable timber.

The difficulty of growing the ordinary species of oak, ash and walnut is the long period required for their maturity, which renders hopeless, except on the best soils, all chance of an adequate financial return. Without vigorous first crosses, the most valuable classes of timber can only be grown in limited quantity.

Immunity from diseases might be expected in some, if not all, first crosses. In the case of ordinary species, individuals of great vigour are undoubtedly less liable than weaklings to the attacks of most fungi, and are probably less sought after by insects like Chermes and Aphis. In this way, the Dunkeld hybrid Larch (*Larix eurolepis*, A. Henry) may prove immune to *Dasyscypha*. There is also a possibility of obtaining hybrids, capable of thriving on certain classes of soil, as chalk and peat, on which ordinary kinds of trees cannot be properly grown.

An important question is the propagation of these vigorous crosses once they are created. The first cross does not come true from seed and can only be multiplied by vegetative reproduction. This is easy when the trees are readily propagated by cuttings, as in the case of poplars and willows, or by layers, like the Huntingdon and Belgian elms. We may resort to grafting low on stocks, which should be seedlings of one or other parent.

No explanation has yet been offered in the author's opinion as to the real cause of the extraordinary vigour displayed by hybrids. The vigour is distributed over the whole plant, and is as conspicuous in the roots as in the stem and leaves. What we actually observe is not only an acceleration of, but also an increase of cell-division in all parts of the plant. The cells divide very quickly, continue to divide, and thus build up a taller stem, a more extensive root-system, etc. It is possible that the stimulus which causes growth (i.e., cell-division) to commence and to continue is some soluble compound or enzyme. Whether the amount of vigour in hybrids is directly associated with the degree of relationship between the individuals that are crossed is a disputable

point, but one of practical interest in the selection of parents for crossing experiments. One of the author's most vigorous hybrids *Populus generosa*, is derived from two parents so little related that they are placed in two distinct sections of the genus. A cross between two races of the common alder shows considerable vigour, though the parents can only be distinguished by the most trivial characters. The fact, if established, that different races when crossed give vigorous progeny could be turned to practical account in plantations and forests where natural regeneration is looked for. The introduction of a few lines of the Riga variety into a plantation of native Scots Pine might ultimately (as pollination would be affected by the wind), give seedlings of enhanced vigour.

The production of hybrid trees can be undertaken with the best chances of success in southerly stations, where numerous species happen to be cultivated. If hybridization is tried on a commercial scale, lofty green houses and ladders will be required for the protection and easy handling of the flowers of many species.

Very little has actually been done in hybridization of forest trees. Klotzsch started work in this direction in 1845 at Berlin. He crossed four pairs of species, all common trees (pine, oak, alder and elm), and after eight years the hybrids averaged one-third better than the parents. We next hear of artificial hybridization of trees in California, the most notable being the production of the Royal and Padox hybrid Walnuts, by Burbank. The statements currently made in books about these are gross exaggerations; nevertheless, there was considerable increase of growth. The original Royal Walnut, produced by a cross actually made in 1878, was measured by Shull in 1907, and found to be 50½ ft. in height and 26 inches in diameter breast high. The author's experiments, carried out in 1909-1914, produced several interesting hybrids, the most remarkable being *Populus generosa*. Subsequent experiments in hybridization carried out at Kew during the war have resulted in the production of numerous seedlings of ash from various crosses that were carefully made, the parent species being *Fraxinus excelsior*, *F. americana*, *F. pennsylvanica* and *F. oregona*. In no case can one detect the slightest difference between the seedlings and the mother parent, and it seems then as if this is an example of that Bateson calls monolepsis. The occurrence of this phenomenon in *Fraxinus* is very embarrassing and would seem at first sight to put a stop to all chance of obtaining true hybrid ash trees. In nature, however, there are cases where hybrids occur, but occur with great rarity, the conditions for their production being unknown. In the case of the ash, the experiments ought to be multiplied and be

carried out on a very extensive scale in some place where pollen of numerous species would be available. The author suggests Washington, D.C. as the best locality.

The financial advantage of producing a hybrid ash is obvious, but may be simply illustrated as follows. Grant that on a certain soil the common ash attains the requisite size and suitable for felling at 70 years old, and that the hybrid ash, quicker in growth, equals this at 56 years old. Assuming the rate of interest to be 5 per cent which means the doubling of capital in 14 years, it will be readily seen that the hybrid ash in this case is twice as productive as the common ash. The doubling of the value, is an object worth considerable outlay in experiment, and in the author's opinion the artificial production of hybrid trees ought to be taken up seriously and arrangement be made for the establishment of a station for this research either in France or in the United States. This station might be internationalized.

41.—The Electrification of Seeds by the Wolfryn Process.—SUTTON, M. H. F., in *Sutton and Sons, Bulletin* No. 11, pp. 1-7, Reading, 1920.

A series of tests were carried out with seeds of mangold, swede, cattle cabbage and carrot to compare the percentage of germination and the crop values from seed:—(1) untreated (2 control plots); (2) treated by the Wolfryn process; (3) immersed in salt solution; (4) immersed in sulphate of ammonia solution; in the two last cases, 4 oz. per gallon solutions and subsequently dried at a temperature of 100°F. The purpose of the experiment was to ascertain if the process is sufficiently beneficial as regards results to justify the expense entailed, and also if the benefit is due only to this process or if equally satisfactory results can be obtained through immersion alone.

Germination Test.—Notwithstanding the one or two points which appeared slightly in favour of the electrified seed, the general results could only be regarded as inconclusive. The mangold seed (electrified) showed the highest germination, but was closely followed by the seed immersed in sulphate of ammonia solution. The untreated seed with carrot and cabbage stood first in the final results.

Field Test.—On light loam on a gravelly subsoil; in 1918 dressed with farmyard manure and cropped with lettuces, endives, etc.; no manure in 1919. In this case also the mangold electrified seed gave the more marked result and a slightly higher yield than any of the other tests.

In no case was the plant from electrified seed observed to appear above ground in advance of the others. With regards to the other crops, reviewing the outdoor tests as a whole the results hardly appeared conclusive, the returns from the electrified seed showing no distinct advantage over the other sections.

149.—Methods for Differentiating between the Seed of Mangolds and Sugar-Beets.—

PIEFER, H., in *Zeitschrift des Vereins des Deutschen Zuckerindustrie*, No. 1919; reproduced in *Deutsche Landwirtschaftliche Presse*, No. 1, pp. 3-4, 1920.

In most cases, the glomerulæ of the mangold can be readily distinguished from those of the sugar-beet after germination (not before), by the colour of the plumule, above and below ground, by the radicle leaves, etc.

It is sufficient therefore to conduct germination tests by burying the seeds 2 cm. deep in small receptacles containing garden soil, exposed to diffused light, covered with sheets of glass (uncoloured) and at a temperature of 15°C. After 8 days, when the first shoots appear the sheets of glass should be removed, and the seedlings watered, if necessary. After 2 or 3 weeks, the seedlings are 2 to 3 cm. high and the process is ended.

For examination purposes, the seedlings are pulled up whole and examined individually on a black plate, comparing them with seedlings possessing definite characters proper to the sugar-beet.

In the sugar-beets, the hypocotyl is colourless, and the epigeal portion is generally (80%) rose-coloured or greenish white (some 20%).

In mangolds with yellow or orange coloured roots, the stems are either entirely yellow, or distinctly orange, with slight shades.

In mangolds with red roots, the stems are distinctly carmine in colour, which increases in intensity from the first foliage leaves downwards.

The only mangolds which may be confused with sugar-beets are those with white roots and the Lank variety, owing to the similarity in stem coloration.

45.—Early Varieties of Wheat and Oats.—

SEVERIN, R., in the *Comptes rendus de l'Académie d'Agriculture de France*, Vol. VI, No. 25, p. 640. Paris, July 7, 1920.

With the idea of completing, in the order of ripening, the series of early wheats that are rust-resistant in the climate of the Gironde, the author presented to the Académie, after Pusa No. 4, Hindi and Pereal Toti, type ears of 3 varieties of the same order and suitable to arid soils of average fertility and to the rudimentary methods of dry farming, as these wheats can grow with as little as 11 to 14 inches of rain. These

wheats are of average productiveness and are adapted to producing early crops, for they ripen earlier than rye and all the native wheats (semi-winter), or to extra-late spring-sowing, when the crop ripens at the same time as autumn wheats. They can also be grown in summer, in order to compensate for any deficiencies in the normal harvest by a new autumn crop. They are as follows:—

(1) Awnless "Cedar Wheat", of Hindoo origin, selected by the Agricultural Station of Berkeley, California. Its straw is short, fine, flexible, resistant to lodging, and the red, glutinous grain is characterized by a dorsal furrow.

(2) Awned "Propo" wheat, of very vigorous growth, strong tillering and regular yield. Its narrow leaves, the flexible straw that bends under the weight of the ears, all contribute to form the pendant tufts that characterize its habit. The grain is whitish, and gives a lemon flour much prized for fancy baking and pastry making.

(3) Chinese wheat (introduced by Versin of Orleans in 1918) has an awned, cylindrical, ear, which is short and blunt, and packed with coloured grain emerging from the glumes; the grain is dry and semi-glutinous. This variety is characterized by such a capacity for tillering that it may be said to bear two crops a year.

The author subsequently presented 2 samples of awnless, Schribaux Ligowo X Brie oats (1) The Ligowo X Brie oat cultivated in Gironde has no awns, as has been found on growing it in summer and spring for two years. He also showed the "Liberty" variety of oat, which was obtained by Prof. Saunders (Cerealist of the Dominion of Canada). It is awnless, which makes it much in request by the oatmeal industry, and, in addition, very early.

50.—Perennial Rye Grass and Wild White Clover.—GILCHRIST, PROF., in *The Journal of the Ministry of Agriculture*, Vol. XXVII, No. 7, pp. 674-677. London, Oct., 1920.

A lecture emphasizing three important points in grassland improvement: (1) the benefits following the inclusion of wild white clover (*Trifolium album*) in seed mixtures; (2) the value of perennial rye grass and the proper method of retaining and developing this grass; (3) the improvement of turf which results from proper treatment of grass.

I.—After many years' experience the mixture used for three-year leys on poor clay with excellent results was as follows: 16 lb. perennial rye grass, 10 lb. cocks foot (*Dactylis glomerata*), 4 lb. timothy (*Phleum pratense*), 4 lb. late flowering red clover, 1 lb. trefoil and 1½ lb. wild white clover per

acre. The rotation was a six course one and since 1912, five of the 3 year leys were reported as producing in the first, second and third years, 42 cwt., 45 cwt., and 38 cwt., per acre respectively. The unusual results were said results to be due to the inclusion of the white clover.

The clover aftermaths were found most valuable for grazing and in consistently good condition, and the turf at the end of the 3 years was always excellent.

On poor stiff clay soil of low value an addition of 4 lb. wild white clover gave an average crop of hay for eleven years of 34 cwt. per acre compared with 23½ cwt. without this addition.

With regard to the treatment of the leys, a good seed bed is advocated as being of the greatest importance. The only manure used throughout the whole experiment was 10 cwt. per acre of basic slag. This was applied to the young seeds as soon as possible after the barley crop was harvested on the 3-year leys, and every third year on the above mentioned poorer soil.

The inclusion of late flowering red clover in the mixture was due to clover sickness to which the ordinary red clover is more readily addicted.

II.—The lecturer explains that previous failure with perennial rye grass was due largely to the absence of close grazing and heavy treading by stock. Several instances are quoted showing that by paying due attention to these two points, the more nutritious will be the pasture and the more numerous the head of grazing stock which it will carry.

To illustrate the improvement of turf which follows the treatments outlined, specimens indicated that: (1) Unmanured turf consisted mainly of poor wiry bent fescue grasses, stunted and starved wild white clover plants, and 2 inches of dead organic matter, and underneath an apparently worthless soil; (2) treated with basic slag and closely grazed with cattle showed instead an abundance of perennial ryegrass and other good grasses, and a luxuriant growth of wild white clover. The subsoil was a good sandy loam, dark in colour with rich organic matter and moisture.

159.—Low Temperatures in Floriculture.—MARINO, A., in the *Rivista del Freddo*, Year VI, No. 8, pp. 277-278. Rome, Aug., 1920.

From the Floricultural point of view the chief points of interest for the refrigerating industry are:—(1) To be able to retard the growth and, consequently, the flowering of plants; (2) to be able to preserve the flower as long as possible.

The following facts have been deduced from practical observations:

The lily-of-the-valley flowers quickly, and arrives at maturity, about three weeks after being taken from the refrigerator. *Spiraea* matures in 6 or 7 weeks, *Azalea mollis* Bl. (*Rhododendron molle* G. Don) in 5 or 6 weeks. The different species of *Lilium* (*longifolium*, *auratum*, and *lenuifolium*) flower, the first after 13-15 weeks, the second after 16-18 weeks, the third after 18-20 weeks. *Lilium longifolium*, potted in the summer, flowers in 16-18 weeks. Usually, lily bulbs potted after the middle of September flower, 1, 2 or 3 weeks after, according to the time of potting, but this should not be later than the second week in November.

The temperatures to which the young plants can be subjected vary. *Lilium candidum* bulbs will stand—2.2°C., those of *Lilium longifolium* must be kept at a constant temperature which should not exceed 15°C., and when they bear shoots the temperature should be raised to 18°C., in the greenhouse and 21°C. in the sun. *L. auratum* bulbs can be kept in drained pots with dry earth at 13°C. until they sprout, then at 20°C., until they flower.

The lilac and lily-of-the-valley (rhizomes and young plants) should be kept at a minimum temperature of —8°C. and at a maximum of —5°C. Rose trees can be kept from November to March at 6-10°C.; they can thus be kept from the frosts and all growth is stopped until spring is well advanced.

Dutch hyacinth bulbs are kept at 0-5°C. The hygrometric degree at which bulbs, rhizomes and young plants are usually kept is from 80-90%. In the case of cut flowers the facts are as follows:

Astrea keeps well for 35 days, at a hygrometric degree of 85%. *Chrysanthemums* 45 days, with 90% or more humidity.

The iris is difficult to keep, and resists at most for 12 days at 2°C. with 85% of relative humidity.

The hyacinth keeps well for more than a month at 2°C. and 85% relative humidity.

White lilac keeps better than the coloured varieties; about 30 days.

Lilies (especially *L. candidum*) when not quite open, keep 30 days at 2°C. with 80% hygrometric degree, Narcissi, violets and tulips keep more than a month, better as buds or slightly closed, at 3°C. and 85% relative humidity.

The rose shows little resistance to cold, but buds will keep 8 days at 2°C. and 85-90% relative humidity.

The flowers for conservation should be plucked on days that are neither too hot nor too dry, and put into the refrigerator immediately.

LIVE STOCK AND BREEDING

- 71.—**Inoculating Cattle against Tuberculosis.**—CALMETTE, A., and GUERIN, C., in the *Annales de l'Institut Pasteur*, Vol. XXXIV, No. 9, pp. 553-560. Paris, September, 1920.

The experiments carried out by the authors from 1912-1915 revealed the following facts:—

(1) By means of successive series of cultures of the bacillus of bovine tuberculosis a race of non-tuberculinogenous bacilli can be obtained that are perfectly tolerated by cattle and other animals susceptible to the virus of tuberculosis.

(2) This non-virulent race behaves as a true vaccine, in that, when injected in the right amount into the veins of cattle, it makes these animals immune, not only against experimental test inoculation, but also against infection due to living in close quarters in a contaminated shed.

(3) This immunity, which presumably depends upon the presence of the non-virulent bacilli in the organism, only lasts 18 months after vaccination, but it can be conferred again by annual vaccination, a process which in itself is quite harmless.

RURAL ECONOMICS

- 92.—**The 1921 Wheat Crop in Great Britain.**—MIDDLETON, SIR T., in *The Journal of the Ministry of Agriculture*, Vol. XXVII, No. 5, pp. 224-427. London, Aug., 1920.

There is a widespread impression not only that the British wheat grower contributes a trifling amount to the total food supply, but that any effort made to increase the wheat crop would have negligible results. The author however disagrees and lays stress on the importance of home grown wheat and the fact that this contributes more to the food supply of the United Kingdom than any other farm product, with the exception of milk and potatoes.

Estimations as to the nation's resources were made during the war, and it was then discovered that about 42% of the food was home produced, the chief items in this percentage being: dairy produce 8.3; potatoes 7.4; wheaten bread 6; beef 4; and meat of all kinds 10.5. About 5 million tons of imported feeding stuffs were used in stock feeding, and if the amount of meat and milk made from these is subtracted the total percentage derived through meat and milk from native soil would be reduced to 16.

If 78% of the cultivated land is required for the production of meat and milk which

between them provide about 42% total food stock from soil, it should also be noted that wheat occupies 4% only of the cultivated land, and wheaten bread accounts for 16% of the stock of food grown on the soils. Wheat offals and straw also contribute to the meat and milk supply; before the war less than 70% of the grain was made into bread. Hence the importance of growing more wheat. The land even now devoted to this purpose produces seven times as much food per acre to that employed in stock farming.

The change in the relationship between producers and consumers is very marked since the war, and an increase in home supplies is obviously essential. The rise in the cost of American wheat which has taken place during the last few months is due to a cause which has a peculiar significance for the British farmer. The total wheat crop of Canada, the United States and Argentina 1909-13 averaged 28,200,000 tons; in 1915, 44,100,000 tons, and an average production of 33,520,000 tons in 1915-19, and last season's harvest, 36,700,000 tons. The American effort made up for the loss of the Russian crop. It should however be noted that in 1920 the United States practically returned to its pre-war acreage and the total yield expected is 22,000,000 tons as against 25,600,000 last year and 18,700,000 in 1909-13.

But the United Kingdom is the greatest purchaser of wheat and the United States grows all the wheat she needs and a little more. There is therefore evident necessity in developing the supplies in the former country, now freed from war conditions and limitations. Extensive autumn sowing has therefore been urged.

- 210.—**Payment for Milk according to its Fat Content.**—PORCHER, C., and VITOUX, E., in the *Comptes rendus de l'Académie d'Agriculture de France*, Vol. VI, No. 38, pp. 916-923. Paris, Dec. 15, 1920.

In certain countries milk is bought at a price in proportion to the fat content. The authors maintain that purchase on this basis is insufficient and ought to be supplemented by a factor relating to the quantity of dry fat extract. For this two very simple tests are sufficient, the first being the total fat content determined by the Gerber method and the second, the density of the milk. In addition the "freshness" of the milk (microbial qualities and cleanliness) must be taken into account. The determination of the acidity of the milk, a usual dairy process, gives an approximate measure of the microbe content of the milk.

216.—**Influence of Fermentation on the Starch Content of Experimental Silage.**—Dox, A. W., and YODER, L., in the *Journal of Agricultural Research*, Vol. XIX, No. 4, pp. 173-179, Bibliography of 13 works. Washington, D.C., May 15, 1920.

The work reported was undertaken to determine any changes the starch might undergo together with the nature of these changes and their relation to other important reactions occurring in silage fermentation. The experiments were made with field maize still green, dented and about at its glazing stage. Determinations were made for moisture, total acidity, alcohol, total sugar and starch, and qualitative tests were also made for the transitional products of starch hydrolysis, namely, soluble starch and dextrins.

From the results obtained the author drew the following conclusions:—

Changes in total acidity, alcohol, and sugar are entirely independent of the starch content of the ensiled maize of the silage produced therefrom.

The silage solution, the medium in which fermentation takes place, which is in contact with the silage starch granules, reached a N/0.04 concentration by the 8th day and almost N/0.5 by the 66th day. Most of this acidity was due to lactic and acetic acids. Strong acids must, according to this, be used and their dilute solutions must be heated. That there was no marked maximum production of alcohol at any time was due probably at first to oxidation of the acetic acid and later to esterification. Unless the rate of fermentation equals the rate of formation of sugar, no formation of sugar from higher carbohydrates, will be indicated after the 8th day.

The first intermediate products resulting from the decomposition of starch were not present in demonstrable quantities. The starch content remained constant throughout the fermentation process, and the granules remained intact, undergoing no physical change that could be detected by microscopic examination. The lack of consistency in the variations and their correlation with the other fermentation changes gives further evidence that the starch is not changed.

Since starch constitutes about 10% of the maize plant at the time of ensiling, and represents over 400 calories of available energy per kg., the fact that no loss occurs during fermentation is an additional argument according to the authors, in favour of silage as an economical food.

PLANT DISEASES

221.—**The International Convention for the Control of Locusts concluded in Rome, on October 31, 1920.**

A conference for the purpose of organizing the international control of locusts was convoked under the auspices of the International

Institute of Agriculture by the Italian Government with the support of the French Government, and met in Rome, at the said Institute, on October 28, 1920.

The representatives of the following States took part in the proceedings:—Argentina, Belgium, Bulgaria, China, Cuba, Egypt, Spain, French West Africa, Algeria, Indo-China, Madagascar, Morocco (French zone), Tunis, United Kingdom, Canada, Greece, Hungary, Italy, Erythrea, Italian Somaliland, Tripolitania, Cyrenaica, Mexico, Paraguay, the Kingdom of the Serbo-Croat-Slavonians, and Uruguay. Canada was represented by T. K. Doherty, Institute Commissioner.

The conference concluded its labours by drawing up the text of the following Convention, which will bear the fixed date of Oct. 31, 1920:—

Art. I.—The contracting States pledge themselves to take all necessary measures for the control of locusts that may injure the crops of such neighbouring states as are signatories of the present convention.

Art. II.—They shall at once take adequate measures to inform the neighbouring signatory States of the movements of locusts under the circumstances mentioned in Art. I.

Art. III.—They shall be empowered to make special agreements in their mutual interest as to the common measures to be adopted for facilitating the control of locusts.

Art. IV.—They recognize, from the date of the signing of the present convention, the International Institute of Agriculture, Rome, as the International Official Centre for the recording and transmission of all information referring to the control of locusts.

They undertake to furnish to the said Institute, at least once a year, and oftener, if occasion requires, all the information, of a technical, scientific, legislative, and administrative character collected on this subject by competent persons.

The International Institute of Agriculture shall disseminate such information as widely and rapidly as possible.

Art. V.—Any suggestion emanating from a Contracting State, and dealing with a modification of the present convention, shall be communicated by the said State to the International Institute of Agriculture, and shall be referred by the latter to a meeting of the Delegates of the Contracting parties which shall be convened in Rome by the International Institute of Agriculture, on the occasion of a General Assembly at the said Institute.

The proposals made by the Delegates shall at once be submitted to the approval of the States adhering to the present convention.

Art. VI.—The present convention shall be signed and ratified as soon as possible,

and the ratifications shall be consigned to the Italian Government as soon as three at least of the contracting states shall have been able to execute them.

Each ratification shall be communicated by the Italian Government, both to the other contracting States, and to the International Institute of Agriculture.

Art. VII.—Any self-governing State, Dominion, or Colony that has not yet signed the present convention may become an adherent to it on request.

Colonies, on the request of the States of which they are dependencies, are admitted as adherents on the same conditions as sovereign States.

Art. VIII.—Their adherence shall be notified through diplomatic channels to the Italian Government, and shall be communicated by the latter to the contracting Governments as well as to the International Institute of Agriculture.

Art. IX.—The present Convention shall come into force, at least as regards the three first States ratifying it, within three months from the date of ratification; and as regards the other States, within six months from the date of the consignment to the Italian Government of the document embodying their ratification or adhesion.

The present Convention has been signed by the Plenipotentiaries of the States:—Argentina, Bulgaria, Cuba, France, French West Africa, Algeria, Indo-China, Mada-

gascar, Morocco (French portion), Tunis, Hungary, Italy, Erythrea, Italian Somaliland, Tripolitania, Cyrenaica, Mexico, Kingdom of Serbo-Croato-Slavonians, Uruguay, and Greece.

104.—The Take-All or Foot-Rot Disease of Wheat (*Ophiobolus graminis*) in New York State.—KIRBY, R., and THOMAS, H. E., in *Science*, new series, Vol. LII, No. 1346, pp. 368-369. Lancaster, Pa., Oct. 15, 1920.

Early in July 1920, at East Rochester, New York, attention was attracted to a small area in a field of soft red winter wheat, where the plants were badly dwarfed and prematurely dead. In many cases secondary culms had been killed soon after their formation. The roots of the plants were rotted and usually broken near the base of the culm; the lower internodes were dark or entirely blackened and enveloped by a dense sheath-like plate of thick-walled brown mycelium. This plate was formed between the leaf sheath and culm. Perithecia in considerable numbers were found embedded in the leaf sheath and mycelial plate. Microscopic measurements of these and ascospores agree very closely with those given by Saccardo for *Ophiobolus graminis*.

As soon as the fungus was identified, steps were taken to determine the source of the infection and to completely eradicate the disease from the infected area.

OTHER ARTICLES ON SCIENCE AND PRACTICE OF AGRICULTURE

On account of lack of space the following articles in the International Review of the Science and Practice of Agriculture can only be referred to. Anyone desiring the articles may obtain them from the Institute Branch, Department of Agriculture, Ottawa.

1.—Agriculture in Persia (Persian Products, Rich and Varied Resources).—*The Times Trade Supplement*, Vol. V, No. 79, p. 435. London, 1920.

2.—Nutritive Value of the Proteins of Barley, Oat, Rye and Wheat Kernels.—OSBORNE, T. B., MENDEL, B., and WAKEMAN, A. S., in the *Journal of Biological Chemistry*, Vol. XLI, No. 3, pp. 275-306. Baltimore, March, 1920.

8.—Agricultural Climatology of Australia.—TAYLOR GRIFFITH, in *Quarterly Journal of the Royal Meteorological Society*, Vol. XLVI, No. 196, pp. 331-356. Bibliography of 7 works. London, Oct., 1920.

18.—The Industrial Utilization of the Locust.—SCHUGURENSKY, L., in the *Revista de Centro Estudiantes de Agronomía y Veterinaria de la Universidad de Buenos Aires*, Year XIII, No. 99, pp. 13-17. Buenos-Aires, April, 1920.

20.—The Potash Salts of Upper Alsace and their Utilization in Colonial Agriculture.—CHEVALIER, A., in the *Bulletin agricole de l'Institut Scientifique de Saigon*, Year II, No. 10, pp. 289-297. Saigon, Oct., 1920.

29.—Studies on Self-Sterility.—EAST, E. M. (Harvard University) in *Genetics*, Vol. 4, No. 4, pp. 341-363, Bibliography of 7 titles. Princeton, New Jersey, July, 1919.

40.—The Artificial Production of Vigorous Trees by Hybridization.—HENRY, A., in *Quarterly Journal of Forestry*, Vol. XIV, No. 4, pp. 253-257, Bibliography of 6 works. London, Oct., 1920.

THE AGRICULTURAL GAZETTE OF CANADA

- 42.—Classification and Detailed Description of Some of the Wheats of Australia.—*Commonwealth of Australia, Institute of Science and Industry*, Bulletin No. 18, pp. 1-48. Melbourne, 1920.
- 64.—A Policy of Forestry for the Nation in the United States.—GRAVES, H. S., *United States Department of Agriculture, Circular 148 Office of the Secretary*, pp. 1-11., Washington, D.C., 1919.
- 76.—The Mechanical Power Required for Crushing Oil-Cakes as a Factor in their Selection.—RINGLEMANN, in *Comptes rendus de l'Académie d'Agriculture de France*, Vol. VI, No. 28, pp. 704-707. Paris, Oct. 6, 1920.
- 80.—Intensive Production of Baby Beef in France.—LAPLAUD, in *Comptes rendus de l'Académie de l'Agriculture de France*, Vol. VI, No. 33, pp. 795-798, and 802-808. Paris, November, 10, 1920.
- 83.—The Goats of the Mediterranean Countries.—MANETTI, C., in *L'Agricoltura coloniale*, Year XIV, No. 9, pp. 367-376. Florence, September, 1920.
- 89.—New Agricultural Implements.—LARUE, P., in *La vie agricole et rurale*, Year 9, Vol. XVII, No. 45, pp. 278-279. Paris, Nov. 6, 1920.
- 91.—A New Hay-Loader.—MANRIN, G., in *the Journal d'Agriculture pratique*, Year 84, No. 42, pp. 316-317. Paris, Oct. 14, 1920.
- 108.—Notes on Spotting of Apples in Great Britain.—HORNE, A. S., and HORNE, E. V., in *The Gardener's Chronicle*, Vol. LXVIII, 3rd Series, No. 1766, pp. 216-217. London, Oct. 30, 1920.
- 123.—Mathematical Enquiry into the Effect of Weather on Maize Yield in the United States.—WALLACE, H. A., in *Monthly Weather Review*, Vol. 48, No. 8, pp. 439-446. Washington, August, 1920.
- 126.—The Choice and Use of Instruments for Measuring Radiation in Agricultural Climatological Researches.—VALLOT, J., in *the Comptes rendus de l'Académie des Sciences*, Vol. 170, No. 12, pp. 720-722. Paris, March, 1920.
- 134.—Researches upon the "Flowerless" Apple-Tree.—LONGO, B., in the *Atti della R. Accademia dei Lincei Serie Quinai, Rendiconti Classi di Scienze fisiche, matematiche e naturali*, Vol. XXIX, Part 9, pp. 290-291. Rome, Nov. 7, 1920.
- 138.—Respective Roles Played by the Bases, Potash, Lime and Magnesium, in Cultivated Plants.—LAGATU, H., in *the Comptes rendus de l'Académie des Sciences*, Vol. CLXXII, No. 2, pp. 129-131. Paris, Jan. 10, 1921.
- 139.—Method for Measuring the Transpiration of Living Plants.—FREEMAN, G. F., in *The Botanical Gazette*, Vol. LXX, No. 3, pp. 190-216. Chicago, Sept., 1920.
- 143.—The Inheritance of Glume Length and Grain Length in a Wheat Cross.—ENGLEDOW, F. L., in *Journal of Genetics*, Vol. X, No. 2, pp. 110-132. Bibliography of 18 works. London, August, 1920.
- 166.—British Empire Forestry Conference.—*Quarterly Journal of Forestry*, Vol. XIV, No. 4, pp. 265-294. London, Oct., 1920.
- 175.—Observation on the Body Temperature of Dry Cows.—KRISS, M., in *Proceedings of the National Academy of Sciences of the United States of America*, Vol. 6, No. 8, pp. 539-541. Washington, D.C., Sept., 1920.
- 190.—The "Excelsior" Motor Plough.—DESSAISAI, R., in the *Journal d'Agriculture pratique*, Year 84, No. 52, pp. 514-515. Paris, Dec. 23, 1920.
- 194.—Agricultural Accounting in Norway during 1918 and 1919.—*Tidskrift for det Norske Landbruk*, Year XXVII, Part 8, pp. 312-319. Christiania, Aug., 1920.
- 202.—Variations in the Composition of Wheat.—LINDET, ROUSSEAU, E., and SIROT, in *the Comptes rendus de l'Académie d'Agriculture de France*, Vol. VI, No. 31, pp. 753, 754, 758-762. Paris, Oct. 27, 1920.
- 212.—Neutralization of Cream.—Rate and Amount of Reaction in Certain Pasteurizers.—RAMSAY, A. A., in *Science Bulletin No. 17, Department of Agriculture, New South Wales*, pp. 3-22. Sydney, May, 1920.
- 214.—Production and Sale of Wool in Argentina.—In the *Revista de la Asociación rural del Uruguay*, Year XLIX, No. 7, pp. 501-504. Montevideo, July, 1920.

THE INTERNATIONAL REVIEW OF AGRICULTURAL ECONOMICS

The following is a brief indication of the contents of the more important articles in the August-September and October, 1921 numbers of the Institute Economic Bulletin. Persons interested in any of the articles may obtain the original bulletin on application to the Institute Branch, Department of Agriculture, as long as the supply for distribution is not exhausted.

AUGUST-SEPTEMBER

The Co-operative Movement in Czecho-Slovakia.—8 pages. This installment deals with the development of agricultural co-operation in the provinces, including the co-operative societies for the use of agricultural machinery, and for the production and distribution of electricity.

The Development of Co-operation in Japan.—18 pages. This is the first installment of a comprehensive article on the subject. It deals first with the origin of co-operation in Japan, and the legislation concerning co-operative societies and their organization. This installment concludes with an account of the general progress of co-operation in Japan from 1900 to 1920.

The National Co-operative Wheat Marketing Scheme in the United States.—6 pages. Discusses the origin of the national scheme, the United States Grain Growers, Incorporated, methods of marketing grain, and the organization and finance of the national association.

Rural Credits in Canada.—17 pages. An authoritative article on the subject by Professor W. T. Jackman, of Toronto University. It gives a detailed description of the legislation in the various provinces of Canada under which organized credit facilities have been furnished to farmers. There is also some account of the working out in practice of the different laws.

Earnings and Working Hours of Farm Workers in Scotland.—9 pages. This installment deals with the question of working hours and agreements between farmers' unions with regard to working hours.

The Agrarian Reform in Greece.—11 pages. The article contains data on the territory and population of the country, then deals with

agricultural production, the organization of the agricultural administration, agricultural credit and co-operation, the land system, and the new agrarian laws.

OCTOBER

The Co-operative Movement in Czecho-Slovakia.—16 pages. This, the final installment, deals with the present position of co-operative societies in Czecho-Slovakia.

Co-operative Land Holding Societies in Italy.—16 pages. Descriptions of the various types of co-operative and holding societies are given. The article then deals with the methods of obtaining credit, the procuring of land to cultivate from private owners and from public lands, instruction in technical questions and management, etc. Statistics showing the progress of the societies are given, and there is an extensive bibliography.

The Agricultural Bank of Paraguay.—8 pages. The Government of Paraguay has provided a well organized system of credit in favour of settlers and of agriculture in general carried out by means of a special organization, the Agricultural Bank, of which the present article gives an account.

The Steps Taken in France During the War to Replace Mobilized Farmers and Farm Workers.—18 pages. Describes the first efforts at organization when the war surprised France in the middle of the 1914 harvest. The article then gives an account of the use made of agricultural labourers drawn from different sources, including: men belonging to the older classes who had been detached for agricultural work, wounded men in course of treatment, students and school-children, prisoners of war, interned civilians, Russian military labourers, colonial labourers, and foreign labourers. Another installment will appear in a later number of the Economic Bulletin.

The Progress of Land Settlement in Australia. 12 pages. The subjects covered in this article are: Land legislation in individual States; Free grants, reservations and dedications; Sales by auction and special sales; Conditional purchases; Leases and licenses; Closer settlement; Resumption by the Crown of alienated lands; Classification of holdings according to size; Total areas of settled lands.

AGRICULTURAL STATISTICS

FOREIGN CROP CONDITIONS

(February 15, 1922.)

United Kingdom.—Almost without exception winter crops germinated well. There is a good, thick plant and the plot is healthy and forward. December was a mild month and favourable to growth. January weather was seasonable, and at the end of the month growing crops were of excellent promise.

France.—The mild temperature and rainy weather of December favoured field work and the progress of vegetation. Attacks of field mice were injurious in some localities. January weather was favourable, and at the end of the month wheat and oats were reported to be in good condition throughout the country. The area sown to winter wheat is officially estimated at 11,860,000 acres against 12,750,000 last year, a decrease of 900,000 acres. The area of winter rye is 2,055,000 acres compared with 2,160,000 acres last year.

Germany.—Showers of rain, hail and snow fell over large areas during December, but proved insufficient to effect any marked improvement in the soil conditions after prolonged dry weather. Winter cereals suffered from early frosts.

Italy.—Germination was regular and uniform in Southern Italy but less satisfactory in the North where continued drought was detrimental. Much needed rains fell in January and the outlook improved.

Bulgaria.—Sowing was hindered by continued unfavourable weather. The area sown in winter wheat is given as 1,840,000 acres against 2,140,000 last year.

Czecho-Slovakia.—Continuous dry weather and frosts in December were unfavourable for winter cereals. There were severe frosts and a lack of snow covering in January.

Roumania.—Severe weather greatly hindered sowing and the wheat crop is expected to be smaller even than last year's.

North Africa.—Unfavourable reports were continued. At the end of January the condition of crops was poor. The area sown to wheat in Algeria is estimated at 1,087,000 acres against 1,950,000 acres last year. The wheat area in Tunis is given as 1,285,000 acres against 1,500,000 in 1921.

India.—At the end of January prospects of the new crops were good throughout the country with the exception of the eastern districts of the Punjab where more rain was wanted. The area to be harvested of the coming wheat crop is 27,739,000 acres, compared with 25,722,000 last year, and a five years' average of 31,142,000 acres.

Argentina.—Fine weather prevailed during harvest, but the production of wheat is reported to be considerably less than at first estimated. The estimate of the 1920-21 crop has been officially reduced from 184,000,000 bushels to 170,000,000. This year's crop was first estimated at 207,000,000 bushels, but latest reports indicate that it may be smaller even than last year's.

Australia.—The weather was favourable during harvest and the quality of the new crop is reported to be good. This year's wheat crop is still estimated as 146,600,000 bushels against 146,800,000 last year.

South Africa.—Some damage was caused by excessive rainfall towards the end of December, but in most districts a good wheat harvest was expected. The new wheat crop is estimated as 8,690,000 bushels against 8,113,000 last year.

THE 1921 CROPS OF CANADA

The following table gives the final estimates of the acreage and production of crops in Canada in 1921 compared with 1920.

Crops	Area		Production	
	1921	1920	1921	1920
	Acres	Acres	Bushels	Bushels
Fall wheat.....	721,000	814,000	15,520,000	19,469,000
Spring wheat.....	22,540,000	17,418,000	285,338,000	243,720,000
All wheat.....	23,261,000	18,232,000	300,858,000	263,189,000
Oats.....	16,949,000	15,850,000	426,233,000	530,710,000
Barley.....	2,796,000	2,552,000	59,709,000	63,311,000
Rye.....	1,842,000	650,000	21,455,000	11,306,000
Flaxseed.....	533,000	1,428,000	4,112,000	7,998,000
Corn for husking.....	297,000	292,000	14,904,000	14,335,000
Potatoes.....	702,000	785,000	107,246,000	133,831,000
			Tons	Tons
Fodder corn.....	585,000	589,000	6,362,000	5,642,000
Sugar beets.....	28,000	36,000	268,000	412,000

THE AGRICULTURAL GAZETTE OF CANADA

UNITED STATES FINAL CROP REPORT FOR 1921

The following table contains the final estimates of the crops of the United States in 1921 compared with those of 1920 and 1919. The figures for 1919 and 1920 have been revised in accordance with the census report for 1919.

Crops	1921	1920	1919
	Bushels	Bushels	Bushels
Corn.....	3,080,372,000	3,208,584,000	2,811,302,000
Wheat.....	794,893,000	833,027,000	967,979,000
Oats.....	1,060,737,000	1,496,281,000	1,184,030,000
Barley.....	151,181,000	189,332,000	147,608,000
Rye.....	57,918,000	60,490,000	75,483,000
Flaxseed.....	8,112,000	10,774,000	7,256,000
Rice.....	35,105,000	52,066,000	41,985,000
Potatoes.....	346,823,000	403,296,000	322,867,000
	Tons	Tons	Tons
Hay.....	96,802,000	105,315,000	104,760,000
Sugarbeets.....	7,678,000	8,546,000	6,421,000
	Lbs.	Lbs.	Lbs.
Tobacco.....	1,117,682,000	1,582,225,000	1,465,481,000
	Bales	Bales	Bales
Cotton.....	8,340,000	13,440,000	11,421,000

UNITED STATES WINTER WHEAT

The area sown to winter wheat in the United States is 44,293,000 acres compared with 44,847,000 last year. Weather conditions have been unfavourable, and the crop in the western part of Kansas is in a critical condition. It will not be possible to determine the losses due to winter killing and drought until there has been a period of

growing weather. It is estimated that nearly 50 per cent of the total winter wheat acreage is more or less affected by weather conditions at the present time (February 20). A small yield per acre is expected in Kansas, in which State nearly one-fourth of the winter wheat of the country is grown.

THE WORLD'S LIVE STOCK

CATTLE

Countries	Recent estimates			Before the war		Difference between pre-war and latest estimates	
	Date	Number	Date	Number	Date	Increase	Decrease
Great Britain.....	June 1921	6,657,002	June 1920	6,712,512	June 1914	.....	475,858
Ireland.....	June 1921	5,197,120	June 1920	5,022,860	June 1914	.....	2,005,600
France.....	Dec. 1920	12,782,110	Dec. 1919	12,373,696	Dec. 1913	.....	115,867
Alsace-Lorraine.....	Dec. 1920	435,133	Dec. 1919	415,096	Dec. 1913	.....	400,239
Italy.....	.....	.....	April 1918	6,239,741	Dec. 1914	.....	.....
Spain.....	1920	3,396,573	1919	3,173,577	Dec. 1913	.....	517,717
Norway.....	.....	.....	1918	1,037,817	1914	.....	108,457
Sweden.....	.....	.....	1918	2,550,828	Dec. 1913	.....	171,818
Denmark.....	July 1921	2,591,000	June 1919	2,286,408	Dec. 1913	.....	.....
Netherlands.....	.....	.....	July 1920	1,968,609	Dec. 1913	.....	127,990
Belgium.....	1920	1,487,361	Mar. 1919	1,285,956	Dec. 1913	.....	362,123
Portugal.....	April 1920	1,382,116	April 1919	1,433,170	Oct. 1911	.....	61,367
Switzerland.....	Mar. 1920	740,693	Dec. 1919	16,317,329	Dec. 1913	.....	3,654,156
Germany.....	Dec. 1920	16,789,844	.....	.....	Dec. 1910	.....	381,065
Czecho-Slovakia.....	Dec. 1920	3,961,830	.....	.....	Dec. 1913	.....	181,579
Latvia.....	1920	730,421	.....	.....	.....	.....	.....
Totals.....	.....	(b) 67,948,198	.....	.....	.....	.....	.....
Total decrease.....	.....	7,217,314 or 9.6%	.....	.....	.....	.....	.....
Canada.....	June 1921	10,206,205	June 1920	9,572,196	June 1914	.....	4,169,388
United States.....	Jan. 1922	65,352,000	Jan. 1921	65,587,000	Jan. 1914	.....	8,760,000
Argentina.....	.....	.....	June 1916	27,392,000	June 1914	.....	1,525,000
Australia.....	June 1920	12,711,067	June 1919	12,738,852	June 1914	.....	1,227,185
New Zealand.....	Jan. 1921	3,112,742	Jan. 1920	3,101,945	April 1911	.....	1,092,571
South Africa.....	1920	5,974,802	1919	5,575,488	1911	.....	177,853
Tunis.....	.....	.....	1919	5,334,823	Dec. 1913	.....	417,519
Egypt.....	1920	561,515	Feb. 1919	505,150	1913	.....	75,583
Madagascar.....	1920	7,518,657	1916	6,588,064	.....	.....	.....
Totals.....	.....	(b) 133,463,811	.....	.....	.....	.....	.....
Increase.....	.....	19,272,623 or 16.9%	.....	.....	.....	.....	.....
Decrease for all countries.....	.....	12,055,309 or 6.4%	.....	.....	.....	.....	.....
Russia in Europe (excluding Poland).....	1919-20	117,428,365	1916	38,373,000	1914	.....	32,704,000
India.....	.....	.....	.....	.....	1913-14	.....	125,042,000 ^a

(a) Includes young buffaloes.

(b) Includes figures for latest date where 1921 or 1920 figures are not available.

THE AGRICULTURAL GAZETTE OF CANADA

SHEEP

Countries	Recent estimates				Before the war		Difference between pre-war and recent estimates	
	Date	Number	Date	Number	Date	Number	Increase	Decrease
Great Britain.....	June 1921	20,452,536	June 1920	19,743,628	June 1914	24,363,396	.....	3,910,860
Ireland.....	June 1921	3,708,290	June 1920	3,585,598	June 1914	3,600,581	.....	6,738,760
France.....	Dec. 1920	9,372,630	Dec. 1919	8,990,990	Dec. 1913	16,131,390	.....	2,070,090
Alsace-Lorraine.....	Dec. 1920	9,33,511	Dec. 1919	31,087	Dec. 1913	44,000	.....	142,037
Italy.....	Dec. 1920	19,337,427	April 1918	11,753,910	Dec. 1914	13,824,060	.....	.....
Spain.....	.....	.....	Dec. 1919	17,734,922	Sept. 1914	16,441,407	.....	.....
Norway.....	.....	.....	June 1918	1,184,813	Dec. 1913	1,326,850	.....	.....
Sweden.....	.....	.....	June 1919	1,563,654	Dec. 1913	972,394	.....	.....
Netherlands.....	July 1921	522,000	July 1920	504,241	July 1914	514,918	.....	.....
Denmark.....	.....	.....	Mar. 1919	437,075	June 1913	842,018	.....	.....
Belgium.....	1920	126,202	Mar. 1919	112,112	Dec. 1910	185,373	.....	.....
Switzerland.....	April 1920	240,553	April 1919	265,413	April 1911	161,414	.....	.....
Portugal.....	Mar. 1920	3,850,733	.....	.....	Oct. 1906	3,072,988	.....	.....
Czecho-Slovakia.....	Dec. 1920	866,060	.....	.....	Dec. 1920	1,158,466	.....	.....
Germany.....	Dec. 1920	6,139,500	Dec. 1919	5,340,527	Dec. 1913	5,476,837	.....	.....
Latvia.....	1920	934,084	.....	.....	Dec. 1913	990,000	.....	.....
Totals.....	.....	80,522,778	.....	.....	.....	89,112,032	.....	.....
Decrease.....	.....	8,589,254 or 9.6%	.....	.....	.....	.....	.....	.....
Canada.....	June 1921	3,675,860	June 1920	3,720,783	June 1914	3,434,261	.....	.....
United States.....	Jan. 1922	36,048,000	Jan. 1921	37,452,000	Jan. 1914	49,719,000	.....	.....
Argentina.....	.....	.....	June 1916	45,309,419	June 1914	43,225,452	.....	.....
Australia.....	.....	.....	Dec. 1919	75,554,082	Dec. 1913	85,057,402	.....	.....
New Zealand.....	April 1921	23,236,328	April 1920	23,919,970	April 1914	24,798,763	.....	.....
South Africa.....	1920	26,288,960	1919	28,491,500	1913	35,711,000	.....	.....
Tunis.....	.....	.....	.....	2,661,579	.....	728,540	.....	.....
Egypt.....	1920	823,542	Feb. 1919	858,107	Dec. 1914	816,000	.....	.....
Madagascar.....	1920	300,000	.....	.....	.....	308,751	.....	.....
Totals.....	.....	213,897,770	.....	.....	.....	243,799,169	.....	.....
Decrease.....	.....	29,901,399 or 12.3%	.....	.....	.....	.....	.....	.....
Decrease for all countries.....	.....	38,490,653 or 11.6%	.....	.....	.....	.....	.....	.....
Russia in Europe (excluding Poland).....	1919-20	.....	1916	63,833,000	1914	37,240,000	.....	.....
India.....	.....	.....	.....	.....	1913-14	23,092,212	.....	.....

SWINE

Countries	Recent estimates			Before the war		Difference between pre-war and recent estimates	
	Date	Number	Date	Number	Date	Increase	Decrease
Great Britain.....	June 1921	2,650,559	June 1920	2,122,459	June 1914	2,646,977	328,469
Ireland.....	June 1921	4,577,169	June 1920	982,418	June 1914	1,305,638	2,450,570
France.....	Dec. 1920	4,585,280	Dec. 1919	4,080,560	Dec. 1913	7,035,850	134,521
Alsace-Lorraine.....	Dec. 1920	358,419	Dec. 1919	308,000	Dec. 1913	493,000	383,074
Italy.....	Dec. 1920	4,228,904	Dec. 1919	2,338,926	Dec. 1914	2,722,000	1,518,779
Spain.....	Dec. 1920	4,228,904	Dec. 1919	4,706,701	Dec. 1913	2,710,185	18,831
Norway.....	Dec. 1920	4,228,904	Dec. 1919	4,706,701	Dec. 1914	2,710,185	260,829
Sweden.....	Dec. 1920	4,228,904	Dec. 1919	4,706,701	Dec. 1914	2,710,185	1,066,706
Denmark.....	Dec. 1920	4,228,904	Dec. 1919	4,706,701	Dec. 1914	2,710,185	900,375
Netherlands.....	Dec. 1920	4,228,904	Dec. 1919	4,706,701	Dec. 1914	2,710,185	435,650
Belgium.....	Dec. 1920	4,228,904	Dec. 1919	4,706,701	Dec. 1914	2,710,185	24,104
Switzerland.....	Dec. 1920	4,228,904	Dec. 1919	4,706,701	Dec. 1914	2,710,185	189,645
Portugal.....	Dec. 1920	4,228,904	Dec. 1919	4,706,701	Dec. 1914	2,710,185	11,016,538
Germany.....	Dec. 1920	4,228,904	Dec. 1919	4,706,701	Dec. 1914	2,710,185	459,127
Czechoslovakia.....	Dec. 1920	4,228,904	Dec. 1919	4,706,701	Dec. 1914	2,710,185	99,948
Latvia.....	Dec. 1920	4,228,904	Dec. 1919	4,706,701	Dec. 1914	2,710,185	
Totals.....		36,952,271		10,517,875		53,198,297	
Decrease.....		16,246,026 or 30.5 %					
Canada.....	June 1921	3,904,895	June 1920	3,516,678	June 1914	3,434,261	1,937,000
United States.....	Jan. 1922	56,996,000	Jan. 1921	56,097,000	Jan. 1914	58,833,000	356,761
Argentina.....	Jan. 1921	3,227,346	June 1916	3,227,346	June 1914	2,900,383	104,537
Australia.....	Jan. 1921	342,227	Dec. 1919	695,968	Dec. 1913	800,505	6,527
New Zealand.....	Jan. 1921	560,155	Jan. 1920	266,829	April 1911	348,754	521,445
South Africa.....	Jan. 1920	560,155	Jan. 1919	724,007	April 1911	1,081,600	
Tunis.....	Jan. 1920	21,220	Feb. 1919	17,681	Dec. 1913	17,400	281
Egypt.....	Jan. 1920	21,220	Feb. 1919	17,681	Dec. 1913	17,400	14,220
Madagascar.....	Jan. 1920	1,000,000	Feb. 1919	21,331	Dec. 1913	543,585	456,415
Totals.....		66,765,492		16,603,000	1916	68,066,690	
Decrease.....		1,801,198 or 1.9 %					
Decrease for all countries.....		17,547,224 or 14.5 %					
Russia in Europe (excluding Poland).....							

In the above tables are given the numbers of cattle, sheep and swine in all the countries for which recent figures are available. There were large decreases in many countries during the war, and in order to show to what extent recoveries have been made, figures are given for 1914 or the year nearest 1914 for which estimates are published. These may be compared with the most recent figures. In the first column the figures for the latest available date are presented. A second column giving the figures for an immediately preceding year is given, in order to show the present trend of the numbers of live stock.

The countries of Europe are given separately from those outside of Europe, and the figures for Russia and India have been placed apart at the end of the tables. The latest estimates for Russia were made in 1916. Since that date the live stock population of that country must have greatly decreased. The estimates for India have been placed separately because that country does not enter into the world's meat trade. The large numbers of cattle in India are used almost entirely as draught animals and beasts of burden.

A feature in the live stock statistical situation is the large decrease in the estimates for sheep and swine in the United States. In that country the figures for the last three

years have been revised in accordance with the 1919 census. This revision shows little change in the number of cattle, but shows decreases from previous estimates of about 10,000,000 in sheep and in swine. The numbers of sheep and swine in the United States have decreased since 1914.

Cattle.—In the countries included in the table the total number of cattle has increased by 12,000,000 or over 6 per cent since before the war. There is a decrease of 7,000,000 in Europe, the bulk of this being in Germany. In the countries outside of Europe, the United States and Canada show large increases since before the war.

Sheep.—The total number of sheep shows a decrease of 38,000,000, or 12 per cent since the pre-war period. This is largely accounted for by large decreases in Australia and South Africa, and the decrease of 13,000,000 in the United States as established by the revised census estimates. The numbers of sheep in Canada and the United States decreased during the past year.

Swine.—There is a total decrease of 17,500,000 or 14.5 per cent in swine since before the war. Germany and France show the largest decreases. There is a large increase in Spain. Germany is regaining her swine population, as there was an increase of nearly 4,000,000 between 1919 and 1920.

THE WORLD'S SITUATION JUSTIFIES THE PRESENT IMPROVEMENT IN PRICES.

In an article prepared in this Branch in the middle of November last and published early in December, many encouraging factors were presented to justify higher wheat prices than then prevailed. As foreshadowed in that article the United States figures for the past three years, since published, had underestimated the United States wheat crop, and this explained the otherwise unaccountable exports from that country. The exchange situation in Europe and the low prices have favoured and as a matter of fact actually stimulated unusually large imports. Recent events, in part disclosed in the preceding notes, now emphasize the general correctness of that analysis of the situation. The exports to Europe have since been and continue to be unusually large. The ocean floating supply has been comparatively small and the importing world's stocks also small. There has been a toning down of the earlier optimistic reports on the new crops and old supplies in the Southern Hemisphere. Serious damage has overtaken winter wheat in the American southwest. Weather conditions have been decidedly unfavourable in Germany, where imports during the first three months of the new crop year were at the rate

of 10 million bushels per month. Rapidly falling prices throughout the world last autumn had the inevitable effect of curtailing the European acreage sown to winter wheat. In fact, the whole trend of demand and supply is the reverse of what existed during the month of November last.

We have once more carefully reviewed the import and export probabilities for the grain year which will end on August 1st next. Without giving detailed tables, suffice it to say that according to our calculations the import demand is for quantities running between 650 and 680 million bushels, while the probabilities of export within the grain year are from 640 to 660 million bushels. The exports of these quantities would leave home surplus stocks reduced by nearly one-half of what they were on August 1st last.

The strength of wheat is somewhat reflected in other cereals and live stock must eventually follow the trend. Lambs and hogs have been leading the way for a fair recovery, and to what extent this result is justified by basic conditions is shown in the world's data for sheep and hogs presented in the preceding article.

DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
PUBLICATIONS BRANCH

Vol. 9: No. 3

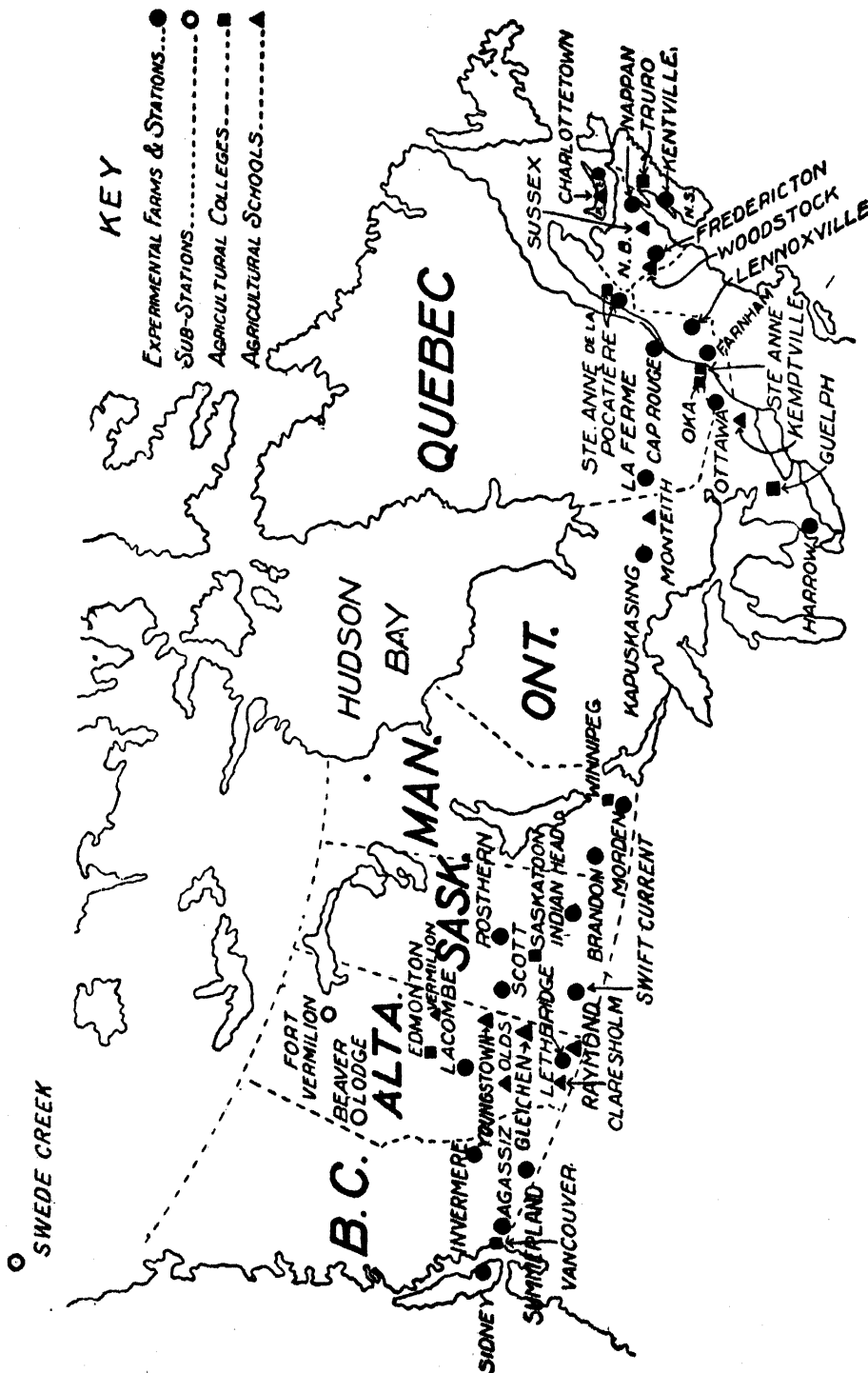
May-June, 1922

The AGRICULTURAL GAZETTE
OF CANADA

J. B. SPENCER, Director of Publicity
Wm. B. VARLEY, Editor

Issued by authority of the Honourable W. R. Motherwell, Minister of Agriculture
OTTAWA

OTTAWA
F. A. ACLAND
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1922



MAP OF CANADA SHOWING THE LOCATION OF FARMS, STATIONS AND SUB-STATIONS IN THE EXPERIMENTAL FARMS SYSTEM, THE AGRICULTURAL COLLEGES AND AGRICULTURAL SCHOOLS

CONTENTS

PART I.

DOMINION DEPARTMENT OF AGRICULTURE

	PAGE
THE EXPERIMENTAL STATION, KENTVILLE, N.S., by W. S. Blair Superintendent.....	187
AN AERIAL SURVEY OF MOSQUITO BREEDING PLACES, by Eric Hearle, Dominion Entomological Branch.....	191
COMMERCIAL FRUIT GROWING IN CANADA, by C. W. Baxter, Commissioner, Fruit Branch....	195
THE DIETARY VALUE OF MILK, by Miss Helen G. Campbell, Dairy and Cold Storage Branch..	198
POTATO INSPECTION AND CERTIFICATION, by George Partridge, Division of Botany.....	202
THE SEED GRAIN PURCHASING COMMISSION.....	205
WESTERN RYE GRASS.....	205
THE GRIMSBY PRE-COOLING AND EXPERIMENTAL FRUIT STORAGE WAREHOUSE.....	206
THE ENLARGEMENT OF THE FINCH DAIRY STATION.....	207
THE SIXTH DOMINION FRUIT CONFERENCE.....	208
CONFERENCE ON THE GRADING OF DAIRY PRODUCE.....	208
COMPOSITION OF STOCK FOODS.....	209
THE DOMINION EDUCATIONAL BUTTER SCORING CONTEST FOR 1922.....	210

PART II.

PROVINCIAL DEPARTMENT OF AGRICULTURE

AGRICULTURAL INSTRUCTION IN NOVA SCOTIA, by Dr. M. Cumming, Secretary for Agriculture..	211
RURAL SCIENCE IN NOVA SCOTIA SCHOOLS, by L. A. DeWolfe, M.Sc., Director.....	216
THE AGRICULTURAL INSTRUCTION ACT IN MANITOBA, by J. H. Evans, Deputy Minister of Agriculture.....	219
PROFIT COMPETITIONS CONDUCTED BY JUNIOR ONTARIO FARMERS, 1921, by W. D. Jackson, B.S.A., Asst. Director of Agricultural Representatives.....	222
QUEBEC LEGISLATION, 1922.....	227
FIELD CROP COMPETITIONS, 1921, ONTARIO, SASKATCHEWAN, ALBERTA.....	228
THE GIRLS' INSTITUTES OF ONTARIO, by Emily J. Guest, M.A.....	229

PART III.

AGRICULTURAL EDUCATION AND RELATED ACTIVITIES

SCHOOL FAIRS AND HOME GARDEN CONTESTS--ONTARIO--1922, by R. S. Duncan, B.S.A., Director, Agricultural Representative Branch.....	232
THE O.A.C. STUDENTS' CO-OPERATIVE ASSOCIATION, by H. C. Mason, B.S.A.....	235

PART IV.

SPECIAL CONTRIBUTIONS, REPORTS OF AGRICULTURAL ORGANIZATIONS, PUBLICATIONS AND NOTES

"AVAILABILITY" IN PLANT FOODS, by Dr. A. McGill, Dominion Analyst, Department of Health.	236
CANADA'S BIRDS, by Harrison F. Lewis, Chief Federal Migratory Bird Officer for Ontario and Quebec.....	239
AMENDMENTS TO THE REGULATIONS UNDER THE DESTRUCTIVE INSECT AND PEST ACT, by L. S. McLaine, Chief, Division of Foreign Pests Suppression, Entomological Branch.....	240
AMENDMENT TO THE APPLE SUCKER QUARANTINE IN NOVA SCOTIA.....	243
IMPORT REGULATIONS FOR WOOL, HAIR, HIDE etc.....	243
NEWS ITEMS AND NOTES.....	294
ASSOCIATIONS AND SOCIETIES.....	247
NEW PUBLICATIONS.....	248
THE LIBRARY.....	249

PART V.

THE INTERNATIONAL INSTITUTE OF AGRICULTURE

	PAGE
FOREIGN AGRICULTURAL INTELLIGENCE—	
Crops and Cultivation.....	252
Live Stock and Breeding.....	258
Farm Engineering.....	260
Agricultural Industries.....	260
Plant Diseases.....	261
Injurious Insects.....	263
The International Review of Agricultural Economics.....	266
Agricultural Statistics.....	267

The AGRICULTURAL GAZETTE

OF CANADA

VOL. IX

MAY-JUNE, 1922

No. 3

DOMINION EXPERIMENTAL FARMS

THE EXPERIMENTAL STATION, KENTVILLE, N.S.

BY W. S. BLAIR, SUPERINTENDENT

THE placing of an Experimental Station at Kentville, Nova Scotia, grew out of an agitation on the part of the Nova Scotia Fruit Growers' Association for a fruit experimental farm in the Annapolis Valley. The earliest educational activities of the above association resulted in the opening of a horticultural school at Wolfville, N.S., and they were assisted in this undertaking by the Provincial Department of Agriculture. This school later became a part of the Nova Scotia Agricultural College, Truro, and its removal from Wolfville was agreed to on the understanding that a fruit experimental farm be established in its place. This agreement was carried out and a part of the present experimental farm was purchased by the Nova Scotia Government, its selection being largely left to a committee appointed by the Nova Scotia Fruit Growers' Association, of which R. S. Eaton, Esquire, Kentville, was chairman and the most active in bringing about the location of the station at Kentville. The following year, 1911, this farm was taken over by the Federal Department of Agriculture and made a part of the Experimental Farms System. Active work was commenced in the spring of 1912 under the direction of the present superintendent.

The original farm was 294 acres and to this was added 7 acres of woodland, making 301 acres, which for the most part was uncleared and included a broken ravine of approximately 125 acres. This ravine is too rough to be of any agricultural value, but is desirable as a wooded park area. The area actually cleared from green forest amounts to 127 acres, all of which is now devoted to fruit or farm crops. The balance of the farm, some 49 acres, was more or less cleared when the purchase was made. In 1920 an adjoining farm of 130 acres was purchased and used as a training farm for returned men. This area included 18 acres of bearing orchard, 11.5 acres of dyked lands, 20.5 acres of cultivated land and 80 acres of unbroken pasture land and woods, 15 acres of which has since been cleared. An area of 21 acres situated between the two farms has been secured under lease with option of purchase, which when brought about will give a total connected farm area of 452 acres. This area for the most part is situated within the boundary of the town of Kentville and the entrance to the farm is one mile from the railway station.

The surface soil of the farm is for the most part a sandy loam and has a subsoil ranging from that of a generally well-drained formation to a clay which prevents ready drainage. For experimental work it is found that these clay areas require underdrainage, and some 12 acres have been so treated. The farm purchased in 1920 has much more clay subsoil than the original farm and considerable areas will require underdrainage for the most effective experimental work.

The buildings on the early purchased station property have all been constructed since its inception and include the superintendent's residence, one single and one double cottage. There are two cattle barns, one horse barn and an implement shed as the principal farm buildings. In addition are the dairy building and ice-house, piggery and two smaller buildings for young stock. The poultry equipment consists of a main service building, breeding house of 12 pens, two 100-hen houses, eight colony houses and five brooder houses. The property purchased in 1920 had a dwelling house and several buildings, and the latter buildings have been converted into one stable, capable of storing feed and housing thirty to forty head of steers.

The orchard planted since 1912 amounts to 47 acres, which with the mature orchard purchased later makes 65 acres in tree fruits. The plantings include: apples, 227 varieties, 2,616 trees; pears, 55 varieties, 223 trees; plums, 92 varieties, 367 trees; cherries, 54 varieties, 154 trees; peaches, 47 varieties, 106

trees; apricots and quinces, 12 varieties, 23 trees. This makes a total of 3,489 trees established since the farm was started and includes 487 varieties. These orchards are now coming into fruiting and information relative to the value of the different sorts grown is being secured. Particularly interesting is the collection of English varieties of apples, most of which have fruited, and none of which seems to be of more value than those now generally grown. Spraying experiments and tests with different fertilizers on orchard trees are being carried on. Other tests, including thinning of fruit, pruning and cultivating, are being conducted.

The relative cost of spraying and dusting, and the efficiency of insecticides and fungicides when used as a dust or in the form of spray for the control of insects and diseases is one of the problems studied. The results as indicated below were secured by dusting and spraying one acre of 40 trees, twenty-five years old, three times in 1921.

	Bordeaux Dust	Sulphur Dust	4-8-40 Bordeaux Arsenate	Lime Sulphur 16-40 Arsenate
Materials used	216 lbs.	246 lbs.	780 gal.	780 gal.
Time to apply	45 min.	45 min.	5½ hrs.	5½ hrs.
Cost of material	\$12 96	\$17 22	\$14 19	\$10 14
Cost of application	60	60	4 20	4 20
Total cost	\$13 56	\$17 82	\$18 39	\$14 34

Three applications were made of spray and dust and the cost of application is charged at the rate of 80 cents per hour. The results from five applications of dust are also given. The effi-

ciency of the sprays and dust for scab control as determined from the fruit picked in 1921 was as follows from Gravenstein and McIntosh Red,—

	Cost per Acre	Per Cent Scab	
		Gr.	McI.
Bordeaux dust, 3 applications, 2 before and one after bloom . .	\$13 56	24	..
Sulphur dust, 3 applications, 2 before and one after bloom . .	17 82	19	..
Bordeaux spray, 4-8-40, 2 before bloom and lime sulphur 1 to 40 after	16 91	6.4	9.0
Lime sulphur 1 to 40, 2 before and one after bloom	14 34	3.5	12.0
Bordeaux dust, 5 applications, 3 before and 2 after bloom . .	22 60	8.0	..
Check, not sprayed . . . . .	.....	37.0	..

Small fruits have been grown in considerable areas and include trials with strawberries and bush and cane fruits, thus furnishing information of value

concerning their culture. Vegetables are included in the horticultural tests and information of value to those interested in these crops is secured. The orna-



Experimental Station Kentville N S — General View

mental plantings are a striking feature at the Station, and much aid is given to those interested in this phase of horticulture. Potatoes are largely grown in the Annapolis Valley district for export to Havana. Consequently considerable attention has been given to this crop in an experimental way, to determine the best varieties and methods of culture likely to give the largest returns. The importance of rotation and planting on clover sod has been demonstrated, and an effort to produce disease-free seed for distribution has been fairly successful.

While the Station was primarily intended for horticultural investigational work, yet because of the large stock

milk production, but at the same time maintaining beef qualities that would give them good standing as beef producers. The aim is to qualify as many as possible in the Record of Performance class, and at present 13 have so qualified, 2 having passed twice, 2 three times and one five times. One cow has a record of 10,864 pounds of milk; four over 8,000 pounds; five over 7,000 pounds; seven over 6,000 pounds and seventeen over 5,000 pounds. The rule in breeding is to produce as far as possible, a calf from each cow within the year, but the actual time between calving periods has been 387 days with 293 milking days.

Twenty-four head of steers are being fed in an experimental way, there be-



Experimental Station—Vegetable Test Plots

raising and general farming interests in the district served, a herd of Shorthorn cattle has been established, and general farm crops have been grown. The Shorthorn herd at present consists of 61 head of dual-purpose animals conducted under the accredited herd plan of the Health of Animals Branch of the Department of Agriculture. This stock is cared for as a dairy herd having in view increased

ing six steers to a test. These are bought in the fall and turned off in a finished condition at Easter. There are four pairs of draft horses and two driving horses at the Station. A limited number of Yorkshire swine are kept in order to supply breeding stock for farmers. Barred Plymouth Rock and White Wyandotte are the breeds of fowls carried, and attention has been

directed toward increased egg production by trap nesting and breeding from the most productive birds.

During the past two years it has been possible to produce the hay required for the stock, and an average of over 200 tons of corn silage has been grown. The climatic conditions are particularly suitable for corn, and it has been one of the most satisfactory silage crops. Mangels and turnips amounting to 5,000 bushels annually are also grown. The area in oats during the past season was limited, and because of dry weather the yield was light, but in 1920 the yield was over 2,000 bushels and ranged from 46 to 74 bushels per acre.

Because of large quantities of fertilizer being used on orchard and field crops throughout Western Nova Scotia, extensive experiments with fertilizers are being carried on, there being nearly 400 test plots comprising 25 acres. Experiments with ground limestone have been

given special attention, and these tests have revealed great gains from its use, particularly in obtaining large clover yields and bringing in fields of low fertility. Soils generally in this section are deficient in lime and more or less acid, which accounts in a large measure for poor hay yields, and it has been shown by tests covering several years that two tons of ground limestone applied every three or four years when seeding to clover will double the yields of clover hay and greatly improve conditions for future crops. Tests covering a period of six years show a net increase of \$93.13 per acre in value of crop in the limed area over that not limed but otherwise similarly treated, an annual gain of \$15.52 per acre. The average annual cost for this gain was \$2.80 per acre per year. Plots 25 and 32 were manured at the rate of 15 tons per acre in 1916 and 1919, and on plot 32 two tons of limestone per acre was applied in 1916 and 1919.

Fertilizer	1916 Potatoes Bushels	1917 Wheat Bushels	1918 Hay Pounds	1919 Potatoes Bushels	1920 Wheat Bushels	1921 Hay Pounds
Manured and limed	228	21	4,155	347	29	3,180
Manured	211	13½	1,575	289	18	1,360
Gain	17	7½	2,580	58	11	1,820

Because of fruit growers being greatly benefited through bees pollinating orchards, an effort has been made to encourage the beekeeping industry. Some 60 colonies are kept, and experiments covering their management and

wintering are being carried on. It has been found that on an average a colony will produce 100 pounds of extracted honey per year if reasonable attention is given to its management.

AN AERIAL SURVEY OF MOSQUITO BREEDING PLACES

BY ERIC HEARLE, DOMINION ENTOMOLOGICAL BRANCH

DURING 1921, the Canadian Air Board co-operated with, and rendered signal assistance to, the Dominion Entomological Branch in a study of mosquito breeding areas in the Lower Fraser Valley of British Columbia.

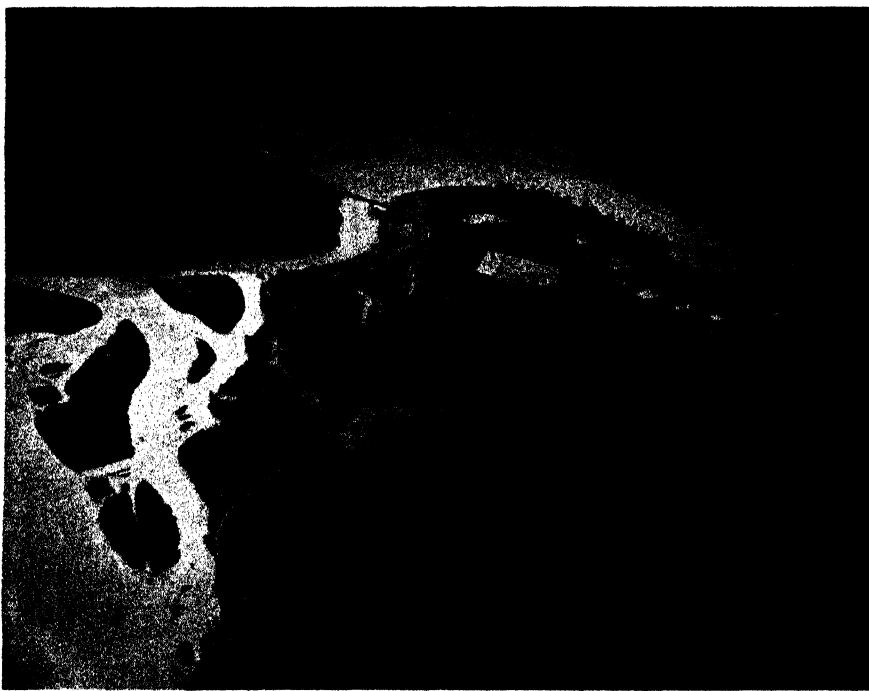
For a number of years requests had been made for an intensive study of the mosquitoes of the district, as it was known that certain of the species affect all outdoor activities. Fruit picking has been hampered; lumber camps were forced to close down; considerable losses

THE AGRICULTURAL GAZETTE OF CANADA

had been incurred in the dairy sections through the drop in milk production, etc. The enjoyment of beautiful summer days is certainly clouded by the scourge of these winged insects that irritate so effectively.

The investigation embracing 2,000 square miles of affected territory was commenced in 1919. The first season was spent in a survey to ascertain the mosquito fauna of the district, and the area was thoroughly scouted over by means of an automobile. The second

1921 has been the mapping of the breeding areas and it is in connection with such work that aerial surveys have proved of the utmost value. Those who were in the raid zone during zeppelin activities may remember that ornamental ponds were drained dry in the cities, because they stood out so clearly as to act as guides to the raiders. The mosquito hordes, which raid the houses, woods and fields of the Lower Fraser Valley in restless search of blood of humans and of cattle, have had this lesson of



Nicomen Islands—Flood conditions.

season was mainly devoted to a study of the factors determining mosquito abundance, and of the two species constituting the pest—the flood water mosquitoes—*Aedes aldrichi* and *Aedes vexans*. In order to study these under natural conditions a motor boat and canoe were utilized to penetrate the depths of the huge cottonwood flood swamps, that are the main breeding places. Work of special importance in

zeppelin days applied against them; and their breeding places—temporary flood water swamps—stand out clear and distinct to the view of those in the cockpit of an aeroplane. The first step in attacking the mosquito pest—the mapping of the breeding areas—is thus made possible and is accomplished with ease.

By arrangement with the Air Board one of the seaplanes of the Vancouver station was on occasions sent to Hatzic

THE AGRICULTURAL GAZETTE OF CANADA

Lake in response to a telephone call. What we desired to obtain was a series of photographs and observations of the more important breeding areas under different flood conditions—one at a river level of about 17 feet 6 inches (under which no infestation materializes); and one at a river level 19 feet (extensive floodings at very high levels are almost invariably followed by a serious outbreak of mosquitoes.)

For the best results in aerial photography certain conditions are necessary. The visibility must be good—that is, the atmosphere must be clear and devoid of blue haze or smoke; the day should be cloudless—the shadows of clouds on the earth's surface give a patchy mosaic, and the passage of thunder clouds causes the atmosphere to be so "pockety" that a level, even course is hard to maintain. For the best results in the work we had planned it was necessary for the right river level and satisfactory weather conditions to coincide.

Fortunately the river reached a level of about 17 feet 6 inches during weather conditions almost perfect for aerial photography; and on May 28 the seaplane C.Y.B.B., piloted by Mr. W. H. Brown, flew over the entire valley, using Hatzic Lake as the base. Mr. C. J. Duncan, the station photographer, obtained a splendid series of mosaics and obliques that included practically all the important breeding areas from Hope to Vancouver. The writer directed the taking of these and during the flight obtained extensive notes on flood conditions, vegetation, etc., in the individual breeding places. Several breeding areas, which had not before been located were noted. In the morning three hours flying covered the upper end of the valley. Much of this time was spent in attaining height, as the photographic work was done at over 7,000 feet. During the afternoon an hour's flight back to the Jericho station gave all the data needed at the lower end of the valley. In a total of four hours' flying time we obtained data covering all the flood water

breeding areas in a territory of some 2,000 square miles. It was essential to obtain this data all in one day, on account of the fluctuation of the river level. Imagine the army of surveyors and the expenditure needed to obtain this information by any other means than by aerial survey.

Two days prior to our flight rain had washed the air clean of the minute particles of dust and smoke, and the atmosphere was vividly clear and splendid visibility obtained. The valley lay under us, flattened out at that height to resemble a huge map with every field and detail distinct and clear-cut. The contrast in colour between bare fields and those green with growing crops is greatly accentuated by distance, and the effect in well developed sections is that of a patchwork quilt of many shades. Yellow is especially noticeable and clumps of buttercups stood out with amazing distinctness. Water was so clearly seen that even the smallest of pools could be picked out with ease, and no difficulty was experienced in noting the encroachment of flood water.

On June 12, the seaplane C.Y.B.B. was again sent from Vancouver to pick up the writer at Hatzic Lake—on this occasion Mr. McLeod was the pilot. The river had reached its peak—21 feet 4 inches, and the weather man had again been obliging enough to supply conditions of excellent visibility. A further series of observations and photographs were obtained showing the greatly increased expanses of flood water. The Nicomen Island dykes had given way only a few hours before and a great deal of the island was already under water and provided a most desolate looking spectacle. While we did not obtain as extensive a series of photographs as in the previous flight, careful notes covering every breeding place of importance gave sufficient data to prepare a map indicating those areas upon the reclamation of which depends the control of the mosquito pest. From these observation flights we would esti-

mate that at a river level of about 21 feet there are in the valley approximately 28 thousand acres of temporary flood-water breeding areas of a suitable nature for the production of vast numbers of mosquitoes (of the two species, *Aedes aldrichi* and *Aedes vexans*). The potentialities of such an acreage are hard to imagine, especially in the light

may be of great value in entomological practice. The writer believes that it is his privilege to have been the first to utilize the aeroplane in Canadian entomological observations. The first attempt in this connection was made in August, 1919, when Lieut. G. K. Trimm of the Vancouver Aerial League made a landing at Chilliwack on his way to



Aerial oblique of Harrison bay district, B.C.

of some of our experiments to determine the numbers of mosquitoes in limited areas. By actual count we found 3,218 fertile eggs in one square foot of sod cut from the edge of a meadow subject to flooding. Were all the flooded areas in the valley evenly infested at this rate (which fortunately is not the case) the mosquito population would run into 13 figures.

The results of last year's surveys have proved one way in which the aeroplane

the interior. The writer happened to be passing through Chilliwack at the same time, and persuaded Lieut. Trimm to take him over the Chilliwack, Sumas and Nicomen areas. A few photographs were obtained with a small camera and useful notes were made as to the breeding places in the district. The conclusions from this flight are noted in an article by Dr. O. G. Hewitt.⁽¹⁾ In 1920 and 1921, the Division of Forest Insects of the Entomological Branch

⁽¹⁾ The use of the Aeroplane in Entomological Work. G. C. Hewitt, *Agr. Gaz. of Canada*, Vol. VI, No. 10, Oct., 1919.

carried on extensive forest surveys in Northern Ontario and Quebec in connection with a study of spruce budworm injuries. The results of the earlier surveys are dealt with in an article by Dr. J. M. Swaine.⁽²⁾ Entomological

surveys of this nature can undoubtedly be accomplished with greater economy of time and money when undertaken with the aid of an aeroplane, than by the old labourious methods of ground survey parties.

COMMERCIAL FRUIT GROWING IN CANADA

From an Address delivered at the Annual Meeting of the American Pomological Society

BY C. W. BAXTER, COMMISSIONER, FRUIT BRANCH

IN taking up the subject of Commercial Fruit Growing in Canada, I shall refer briefly to conditions during the past few years, present conditions and the future outlook. Three classes of fruit are grown commercially in Canada—first, apples, second, tender fruits, third, small fruits, which include strawberries, raspberries, currants, and gooseberries.

Apples

As the distance between our eastern coast and the Pacific coast apple-producing provinces is approximately 3,000 miles, it is quite natural that there should be considerable variation in growing conditions and in the fruit. I think therefore that the situation will be better understood if each province be dealt with separately. Commencing at the Atlantic coast we have in the Province of Nova Scotia, the Annapolis and Cornwallis valleys—better known perhaps as "The Land of Evangeline"—where apple growing is carried on to a greater extent than any other branch of agriculture. These valleys are especially adapted to the growing of this fruit, and the close proximity to seaboard offers special advantages to the export markets of the United Kingdom and the Continent of Europe. In 1911, as the result of increased efforts on the part of the grow-

ers and exceptionally favourable weather conditions, Nova Scotia produced a crop of approximately 2,000,000 barrels, a record which has not since been reached.

During the Great War, as we know, there were many things affecting the fruit industry which were very discouraging to fruit growers. Fruit was considered a luxury and a non-essential and, while other branches of agriculture were being encouraged by increased demand and correspondingly increased prices, the difficulties to fruit growers were increased and the export markets were closed to fruit. As Nova Scotia had for many years exported the greater part of her crop to the United Kingdom and did not have a home trade connection with other provinces in Canada, these discouragements were felt more in that province than in any other. The placing of an embargo on the importation of fruit into the United Kingdom resulted in an almost total neglect of orchards in some provinces, but the growers in Nova Scotia, notwithstanding the discouraging outlook, continued to care for their orchards with the result that they have had good, average crops during the past three years of approximately 1,300,000 barrels of commercial fruit. A large percentage of the crop is marketed co-operatively. In one co-operative association there are between 1,700 and

(2). A Survey of our Forests from the Air. J. M. Swaine, *Agr. Gaz., Canada*, Vol. VII, No. 1, Jan., 1921.

1,800 members, representing about 40 per cent of the growers of the province. This I think is one of the most efficient and most economical distributing organizations on this continent.

The St. John River valley, in the adjoining province of New Brunswick, is especially adapted to the growing of some of the best hardy varieties, including McIntosh Red and Fameuse. This province, at the Imperial Fruit Show held recently in London, England, was awarded first prize in the "All Canadian" competitive section for both these varieties. The quantity has not yet been sufficient to supply the needs of the province but, as a railway has recently been constructed, formerly known as the St. John Valley Railway but now owned and operated by the Canadian National Railway system, we are confidently looking forward to this valley becoming one of the best apple producing districts in the Maritime Provinces. The commercial apple crop of New Brunswick in 1919 was 40,000 barrels and in 1920 was 30,000 barrels. The 1921 crop has been estimated at 33,000 barrels.

The province of Prince Edward Island which, as you know, is situated in the Gulf of St. Lawrence and separated from the Mainland by the Northumberland Straits, is not a great factor in the commercial apple crop, and a large portion of the fruit consumed is brought in from the adjoining provinces. It has, however, been demonstrated that the hardier varieties can be successfully grown there. This province is specially adapted to the growing of small fruits but, on account of the difficulties of transportation, fruit growing has not made any great progress during the past thirty years. With the improved railway transportation now in operation it is expected that fruit growing in that province will be greatly increased in a few years.

Leaving the Maritime Province and travelling West about 800 miles, we

come to the principal apple producing districts of the Province of Quebec, where the Fameuse and the McIntosh Red varieties are grown to perfection. This province was unfortunate in losing a large portion of the Fameuse trees, and many trees of the other varieties, as the result of the unusually severe winter of 1917-18 but, notwithstanding this severe loss, the growers are not discouraged, and these orchards are being re-established. The demand for the Quebec grown Fameuse and McIntosh Red in the province of Quebec is such that the highest price paid for any variety has been obtained, and it has not yet been necessary for the growers to look outside their own province for a market.

The province of Ontario, which is one of the oldest apple growing provinces in Canada, and which up to a few years ago produced the greatest quantity, also suffered from the severe winter of 1917-18 and a number of the trees were killed. Had the fruit growers of Ontario followed the practice of the growers in Nova Scotia and continued to care for their orchards during the war years, prior to 1917, the loss from the severe weather would undoubtedly have been less. This province during the past three years produced the following commercial crops: in 1919,—879,000 barrels, 1920,—1,600,000 barrels, and the estimate for 1921 is 960,000 barrels.

Unlike the provinces of Nova Scotia and British Columbia, where apple growing is a specialized industry, the bulk of the apples in Ontario are grown on mixed farms and, on account of the higher prices paid of late for other farm products, the farmer fruit-grower has not been giving much attention to orcharding. However, now that prices of these products have been greatly reduced in contrast to the slight reduction in the price of apples, there is a greater interest being taken in orcharding. While the process may be slow, nevertheless we expect that apple growing will in the near future be carried on as a specialized in-

dustry in Ontario as it is in the other provinces referred to.

In the Prairie Provinces, apple growing is not carried on in a commercial way, and our next and last commercial apple-growing province is British Columbia on the Pacific Coast. This province produced last year 4,000 cars of apples or approximately 3,000,000 boxes. This is about 100 per cent more than in 1920. The increase is largely the result of the increased growth of the trees recently come into commercial bearing. The growers in British Columbia, like the growers in the Northwestern States, have been compelled to adopt co-operative marketing. This province has now one of the most efficient co-operative marketing organizations in Canada, and has established an excellent reputation for reliable grading and packing in both the home and export markets. During the past year the distribution has been greatly widened.

Markets and Marketing

This will give some idea as to the conditions in the commercial apple-growing provinces in Canada at the present time, but in order to form a definite opinion as to the outlook it is necessary that we review the marketing conditions during the past few years. It will be remembered that in 1912 the United States and Canada had one of the biggest apple crops on record and the returns to the growers, generally speaking, were very discouraging. The conclusion reached by many was that there had been over-planting, and this conclusion was strengthened by the fact that there had been extensive planting in the Northwestern States and in British Columbia, and when these plantings came into bearing the price of apples would be so low that it would not pay to care for the orchards. Planting, therefore, practically ceased in 1911, and many orchards were neglected. In 1914 we had another big crop, and when the fruit was ready to harvest, the markets were completely

disorganized as the result of war conditions. Having regard to these facts, and also to the great loss of trees from the unusually long and severe cold during the winter of 1917-18, we are of the opinion that even under the most favourable growing conditions our maximum commercial apple production cannot exceed our greatest production of twenty-five years ago.

The supply of some agricultural products may be increased or decreased in one or two years, but with apples this cannot be done as the plantings of today represent the crop of several years hence, and the law of average is again asserting itself. To-day, although the prices of many agricultural products have materially declined, the price of the best varieties and grades of fruit is being substantially maintained. I therefore feel that the outlook for commercial apple growing in Canada was never better, providing that we profit by our past experience and plant only such varieties as the market requires and which succeed best in the particular district. We are not convinced that we have at any time reached the stage of over-production but that our discouragements, especially in 1912, were due to lack of organized marketing facilities. The large cities and towns were over-supplied, while the smaller consuming centres—and we have many of them in Canada—were receiving a very small proportion of what they might consume. I am at the same time convinced that if we are to avoid a repetition of the unsatisfactory conditions met with in 1912 and preceding years, we must develop an efficient co-operative marketing organization in proportion to our increased production. Unless this is done, the industry will be unbalanced. In fact we are so firmly convinced that our future success is dependent on centralized co-operative marketing that we hesitate to organize more independent fruit growers' associations in Ontario until the independent associations now in existence have established a central co-operative

marketing organization. We fully expect that this will be accomplished before another crop is ready to market.

Tender Fruit

In regard to the growing of tender fruit in Canada, I may say that while pears and plums are grown in all the commercial apple-producing provinces, a very large percentage of the total crop is produced in the province of Ontario and in the Okanagan valley in British Columbia. With regard to peaches, the history of commercial peach growing in Canada has convinced us that the area in which this fruit can be grown with any degree of safety from winter killing is confined to the Niagara peninsula in Ontario and the southern parts of the Okanagan valley in British Columbia. There are a few more districts in Ontario where peaches are grown, but the quantity can have very little effect on the market. Therefore, with efficient marketing facilities provided, peach growing in the districts named should be a very profitable branch of fruit growing. The same conditions would apply to the commercial growing of grapes, although British Columbia has not yet produced any great quantity of these.

Small Fruits

Small fruits, such as strawberries, raspberries, currants, and gooseberries, like pears and plums, are grown in all commercial apple producing provinces, but the greater portion of the total crop is grown in Ontario. In the eastern provinces of Quebec, New Brunswick, Nova

Scotia, and Prince Edward Island strawberries form the major portion of the small fruit crop, the bulk of which is, as a rule, sold within the province. For several years prior to 1910, the prices received by growers were not satisfactory, and it was difficult at that time to obtain sufficient help to harvest the crop, due principally to the exodus of our people to the Prairie provinces. The result was that the acreage in 1911 was considerably reduced, and as labour difficulties continued and were increased during the war years, there was a further reduction in acreage. The demand, however, continued firm and there was a steady advance in prices, which probably reached the peak in 1919 and 1920. Notwithstanding the advance in prices, it was not until the labour situation improved in 1919 that growers were able to increase the acreage to any extent. In 1919 and 1920 the acreage was greatly increased, especially on the Lower Mainland and on Vancouver Island, B.C., where a number of ex-service men have taken up small fruit growing with considerable success under government assistance. During the past season the price of strawberries and some other small fruit declined, but the decline would not have been so pronounced had the jam and canning factories been able to handle even a small portion of their annual purchases. There has been a decided improvement in the marketing facilities for handling the small fruits during the past season, and we are confidently expecting that this branch of the industry can, with profit, be considerably extended.

THE DIETARY VALUE OF MILK

BY MISS HELEN G. CAMPBELL, DAIRY AND COLD STORAGE BRANCH

CANADA is distinctly an agricultural country and dairying is one of the biggest branches of Canadian agriculture. From the standpoint of health, it is safe to say that

there is no branch of work in Canada outside the field of medicine which has as great a bearing on the health of the people as the dairy industry. The health, wealth, usefulness, and civiliza-

tion of any nation or any people depend largely upon the food of its people, and the dairy provides its share of food for Canadians, and a food of the highest order.

Besides the food value of dairy produce, which we shall consider later, the accessibility of this group of foods is a strong point in their favour. The dairy cow lives anywhere in Canada and will carry on her mission as a food producer in every part of every province. Human nutrition has advanced very greatly within the last few years and investigations which have been made on this subject have placed milk and dairy products, such as butter, cheese, skimmed milk, buttermilk, etc., in a more favourable light than at any other time. In fact, the man who has perhaps done more along this line than any other man in North America is so impressed with the food value of milk and its products and with the importance of the dairy industry that he devotes much of his time telling the people about it and doing everything in his power to promote dairying. This man is Dr. McCollum, who has performed so many experiments in his laboratories in Johns Hopkins University, and who is among the best known authorities on nutrition both in this country and in the old land. Many of his earlier experiments in this science were performed to determine the value and comparative values of certain foodstuffs such as corn, wheat, etc., in the feeding of animals. Later, most of his experiments were performed to find out the food value of various foods in human nutrition.

It is necessary to know the constituents of available foods in order to make a wise choice as to quality and quantity for the human body at different stages of growth and at different ages. No other subject is to-day of more vital interest than the welfare of the child, and no phase of this question is more important than proper food. The lack of wisely chosen foods in childhood may be a very serious stumbling block in the

power of the child and a great handicap in after life.

The body is made up of cells which form the different parts of the body, such as bone, muscle, blood, etc. From the food we eat, the body gets the material for the formation of new tissues and for the upkeep or repair of the tissues. There is one constituent of food which serves this purpose, and foods which contain it take first rank among the foods. This substance is called protein, and it is found in eggs, meats, cereals, legumes, fish and in milk and most milk products. All proteins, however, have not the same value; some foods supply protein of greater physiological use than that supplied by other foods. Experiments show that when protein from cereals is the only protein in the diet of growing animals, the body of the animal is able to use only about 30 per cent, but when milk is the only source, the body can make use of as high as 65 per cent. Furthermore, when an animal is fed both cereal and milk protein in combination, it can use all the milk protein and a much higher per cent of the cereal protein. It is easy to translate this into every day life. For instance, if we give a child cereal alone, only a small percentage will really be used to do its special work in the body, but if we add milk generously, not only will the milk proteins be of the greatest value, but a much higher per cent of the protein contained in the cereal. This is true of such staple combinations as bread and milk, oatmeal and milk, rice and milk, etc., and, although these foods have long ago proven their worth, we have only recently understood the real reason of the importance of the combination. It is partly for this reason Dr. McCollum calls milk a "protective food,"—because the deficiencies of other foods are made good by milk in the diet. Eggs and green vegetables are also designated by this term, "protective foods," but milk stands at the top in the opinion of those who are in the best

position to know. It becomes apparent then that milk supplies the very best kind of body-building substances and supplements those supplied by other foods.

The quality of the mineral matter in milk is another reason for its importance in the diet. There are many kinds of mineral matter in our foods, but the chief and most necessary ones are lime, phosphorus and iron. It is this substance which gives rigidity to the bones and teeth, and the child cannot have a strong frame or a healthy body without a sufficient amount in his food. Milk is the chief and cheapest source of lime and not only is it present in whole milk, but in skim-milk, buttermilk, cheese and all milk products, with the exception of butter. The mixed diet is often deficient in mineral matter and by far the most practical and safest way to be sure that the child will have all he needs is to give him plenty of those foods. Phosphorus is also abundant and the need of the body for this substance will be met by a liberal use of milk. Though milk has not a great deal of iron, the amount it contains is of excellent quality and this mineral is common among the vegetables and fruits.

The body needs another constituent in food which it can convert into energy for the body to do its work. The sugar in milk helps to do this, as does also the fat contained in it. Commercially, the fat is the most important and, when milk is bought and sold, usually the price is regulated by the percentage of butter fat it contains. Butter fat has always been recognized as good food and is now looked upon as more or less a standard of value.

But lately cream is known to have another somewhat mysterious value, because of certain substances it contains about which very little is as yet known. The name "Vitamine" was first given to this indispensable substance by a Polish investigator. Dr. McCollum, by his work, proved that there were at least three kinds of vitamins. These he pre-

fere to designate by the non-committal names of Fat Soluble A, Water Soluble B, and Water Soluble C.

As the name implies, the Fat Soluble factor is closely associated with the fats in certain foods, and it is known to be contained in large amounts in butter fat. Professor Sherman says "there is no substitute for fat" in a child's diet, because it contains this indispensable substance, without which, normal, physical growth, or proper mental development is impossible. The fat in eggs and in certain vegetables contains this also, but other fats used as food, such as lard and vegetable oils, are without it. Butter fat is not the only fat containing it; cod liver oil is rich in this vitamine, but cod liver oil is not used in this country as a food. Beef suet contains some, but in insufficient amounts for the needs of the body. Butter fat, therefore, is almost indispensable in the diet of children.

But the fat soluble factor is not the only one necessary; the water soluble vitamine must be included and here again milk assures an adequate supply. Water Soluble B, as well as the third one, Water Soluble C, is much more abundant among our common foods and, as long as a mixed diet is in favour, there is little danger that Canadian people will suffer from diseases which result from an insufficient supply. Eastern people, living largely on rice, suffer from a disease called beri beri, which can be corrected at once by an improved diet containing Water Soluble B. Scurvy used to be the plague of those taking long voyages, and green fruits and vegetables are a safeguard against it, because they contain the Water Soluble C or anti-scorbutic factor. Milk will also correct this disorder and, though it is lower in this anti-scorbutic quality, it is doubly important if the supply of vegetables and fruits is limited. It can be easily understood then how important is clean, fresh milk for babies and children.

Vitamines are not made in the body. The supply must come in the first place from the leaves of plants. If we could eat sufficient green leaves, there would be assured an adequate amount, but our digestive organs could not take care of the amount necessary. Here the cow steps into the breach. She is the most important food factory in the world and nothing made by man can equal the cow in the amount of food material produced, in territory, in efficiency and in economy. A cow eats enormous quantities of green leaves, grass, hay, etc. She will consume 40 or 50 pounds per day and give, say, 10 quarts of milk. That is to say, as Dr. North puts it, for each 4 pounds of green feed, she gives one quart of milk, so that this amount of milk contains the extract of about 4 pounds of green leaves. The cow needs a certain amount for her own body, but the surplus she puts in her milk. Is she not a wonderful laboratory, equipped by nature to concentrate the best of the leaf into a food for human beings. When we realize her importance, we will treat her with more respect, care and intelligence. She gives us good food and, if in good health, she is prepared to give us this food in a sterile, absolutely clean condition. We must admit that we do not always do our share in keeping the milk of the same first-class quality in which we receive it. Are we as particular as possible to keep the milk free from contamination? Do we use covered milk pails, do we clean and curry our cows and wash their udders before milking? Do we milk only with clean hands, clean clothes and in a clean place? Do we take pains to cool the milk as rapidly

as possible and keep it cold? Bacteria and disease germs find milk a fine food as well as we do and it is the best medium for their growth. If germs were big and dark as black cats, we would avoid them, but because they are so small that they cannot be seen, we prefer to trust to luck that they are not there. We can at least keep milk clean and, if we are not absolutely sure of the source of our milk supply, the health of the animals and the persons handling it, we can pasteurize it and make it safer without taking away from the food value of the milk.

How many dairymen are really vitally interested in selling the best milk rather than just milk? Perhaps some day we will have refrigerator cars for transporting milk and, when the millenium dawns, we can count on it that among the chief foods will be clean, fresh, properly handled, pure milk and the foods that are made from it.

The Government of Canada is well aware of the importance of the industry. The Dairy Commissioner, Mr. Ruddick, anxious to serve the public in the best way and, being fully alive to the value of dairy produce as a good food, decided to add to his staff an official whose chief duty it would be to disseminate information on this subject in any way suitable or in any way desired by the people. In this Mr. Ruddick had the support of the heads of the department. To me has been given the privilege of carrying on this work, and I wish to say that in whatever way I can co-operate with any organization or any individual, I shall be happy to do so.

POTATO INSPECTION AND CERTIFICATION

BY GEORGE PARTRIDGE, DIVISION OF BOTANY, CENTRAL EXPERIMENTAL FARM

DURING 1921 this work was conducted along lines similar to those of previous years, with the exception that, it having been found advisable to disregard for certification purposes all fields that failed to come within the standard set for qualification as Grade No. 1, the grade formerly known as No. 2 was abolished. This was followed up by a second field inspection just before maturity (the first inspection being made at the time the plants are in bloom) of all fields which came well within the No. 1 standard at the time the first inspection was made. Although this procedure entailed the covering of most of the seed-growing districts twice during the growing season, an opportunity was thereby afforded the inspectors of deciding whether any element of doubt, which may have existed with regard to the classification of some fields upon the first inspection, was justified or not. It is satisfactory to note that in the large majority of cases the favourable conditions obtaining earlier in the season were fully maintained throughout the growing period.

A considerable extension of territory was included in the year's activities. The provinces of Saskatchewan and Alberta, where in 1920 only a limited survey was made, were more generally surveyed, and a number of fields submitted for inspection. Many of these being found worthy of consideration for seed purposes, the growers were encouraged to submit their crops for certification, a considerable amount being accordingly certified to. It is hoped that a further extension of the work in these two provinces will be possible during next season.

The total number of fields inspected throughout the country was 2,646, containing an acreage of 7,900. Of these, 1,634 fields containing 4,290 acres passed the two field inspections, an average of 61.7 and 58.7 respectively. The amount certified to up to the time winter brought the work to a conclusion in some of the provinces, was approximately 310,000 bushels. When in the spring it is possible to complete the certification of the 1921 crops, this amount will be considerably increased.

Following will be found a tabulation of the work by provinces:—

	No. of fields inspected	No. of fields passed	Acreage inspected	Acreage passed
Prince Edward Island.....	285	178	963	541
Nova Scotia.....	184	121	276	208
New Brunswick.....	254	172	951	639
Quebec.....	1,131	520	4,106	1,726
Ontario.....	218	176	486	431
Manitoba.....	404	367	613	520
Saskatchewan.....	88	38	374	159
Alberta.....	82	62	131	66
Total.....	2,646	1,634	7,900	4,290

The following table gives a comparison between the results of the field inspection of 1920 and 1921—the pro-

vinces being placed in order of merit, calculated from the results of 1921:—

THE AGRICULTURAL GAZETTE OF CANADA

Province	1920			1921		
	Acreage inspected	Acreage passed No. 1	% passed No. 1	Acreage inspected	Acreage passed No. 1	% passed No. 1
Ontario.....	472	256	54.2	486	431	88.6
Manitoba.....	594	275	46.3	613	520	84.8
Nova Scotia.....	379	298	78.6	276	208	75.4
New Brunswick.....	1,413	661	46.8	951	639	67.2
Prince Edward Island.....	886	523	59.0	963	541	56.2
Alberta.....				131	66	50.4
Saskatchewan.....				374	159	42.3
Quebec.....	3,868	837	21.7	4,106	1,726	42.0

As a result of the analysis of our records for the purpose of making this comparison, we are in a position to state that the very satisfactory increase in the percentage of acres which passed inspection during 1921 may be attributed to the employment of improved methods of seed growing and to the more general use of certified seed. This feature is particularly outstanding in Ontario, Manitoba and Quebec, where the percentage increased from 54.2 to 88.6, from 46.3 to 84.8 and from 21.7 to 42.0, respectively. In Manitoba especially, a large quantity of certified seed from Northern Ontario and Minnesota was judiciously distributed and submitted for inspection. Had the weather conditions been more propitious during the earlier part of the season, the results would have undoubtedly been still more gratifying.

In New Brunswick, where considerable difficulty has been experienced during the past few years owing to the prevalence of Mosaic among the Green Mountain variety of potatoes in some districts, special emphasis was placed by the inspectors upon the importance of rogueing the fields in those districts where conditions do not appear so favourable for the production of this trouble. Rogueing was not advocated in fields where Mosaic was present to the extent of more than 5 per cent, but following the introduction of certified seed, in which the amount of Mosaic present was infinitesimal, into some of the potato-growing districts along the North Shore of the province, followed by a thorough rogueing of the fields in 1920

and 1921, a valuable seed crop was produced in the latter year, a large amount of which was quickly purchased by growers from the United States who had surveyed the fields during the season. There is still a considerable quantity of this stock available, and as it was chiefly responsible for raising New Brunswick's percentage from 46.8 to 67.2, no opportunity is lost of recommending its multiplication within the province.

In Nova Scotia the percentage of fields passing inspection was not quite so high as in 1920. There was apparently no increase in the amount of disease present, the abnormally hot, dry season being responsible for indifferent growth in some districts. An unfortunate occurrence of wilt in a number of fields in Prince Edward Island late in the season somewhat reduced the percentage passing inspection. Great enthusiasm on the question of seed potato production has been aroused in this province during the past two or three years, due to the efforts of the inspection service and the officials of the Potato Growers' Association, and the occurrence of wilt was the only factor preventing a far better showing. As previously noted, inspection was conducted in Saskatchewan and Alberta for the first time in 1921, therefore no comparison can be made. However, the past year's results may be considered very promising.

Owing to the vast territory covered by this work, and in which many and varied climatic and soil conditions prevail, it has been found preferable not to adopt permanent standards, but for the

sake of uniformity to revise them year by year should such conditions render revision advisable. The standards adopted for 1921 were as detailed below:—

FIELD INSPECTION STANDARDS

Certified No. 1 Grade Seed Potatoes, 1921

Black-leg.....	3%
Curly Dwarf and Leaf Roll.....	2%
Mosaic.....	2%
Wilts.....	3%
Foreign.....	1%
Misses.....	Not taken into consideration

- (1) If Black leg and Wilt are present alone 7% allowed.
If Black-leg and Wilt are present combined 7% allowed.
- (2) If Leaf Roll and Mosaic are present alone 5% allowed.
If Leaf Roll and Mosaic are present combined 5% allowed.
- (3) If a percentage of (1) and a percentage of (2) are present 6% allowed.

TUBER INSPECTION STANDARDS

Bacterial Rot or Wilt.....	2%
Late Blight and Dry Rot.....	3%
Net Necrosis.....	3%
Internal Spotting.....	3%
Common Scab (occasional spots).....	10%
Common Scab, severe.....	1%
Powdery Scab.....	1%
Rhizoctonia (occasional spots).....	10%
Rhizoctonia, severe.....	5%
Silver Scurf.....	3%
Slightly damaged.....	2%
Foreign.....	1%
Frost injury.....	No allowance
Off Type.....	2%

No. 1 Grade seed potatoes shall not be less than three ounces nor more than twelve ounces in weight, and shall not contain more than a total of five per cent of all diseases with the exception of slight common scab or rhizoctonia, for which an additional five per cent is allowed, and shall not contain a higher percentage of damaged and foreign tubers than is provided for in the standards.

In classifying the fields inspected, we are guided to some extent by the standards and current reports. Owing, however, to the difficulty experienced in some years and during certain periods in almost any year, in recognizing the presence of such diseases as Mosaic and Leaf Roll, it is felt that anyone not thoroughly acquainted with the inspection system might consider that if classification is based entirely upon current reports, sufficient precaution against possible non-recognition of these diseases is not provided for. It may therefore be

stated that at the headquarters of the work, a special card system is maintained which contains the history and behaviour of hundreds of lots of seed inspected year by year, together with their origin. By this means it is possible to trace the history of such seed for several years back, which often results in the rejection of a field, even though a current report may be favourable; the right being reserved to base the classification not only upon present status, but more so upon past history in so far as Mosaic and Leaf Roll are concerned. Experience has made us realize that a system of potato inspection not taking into consideration the record which certain strains have previously made, will not afford such an exclusive guarantee of freedom from systemic diseases as is possible by the method outlined.

A gratifying feature of potato inspection and certification is the continued eagerness on the part of growers across the border to procure seed potatoes certified to under the system. During the fall of the past year sixty carloads were consigned in that direction from Prince Edward Island and thirty-four carloads from New Brunswick, at prices well in advance of those obtainable for ordinary uninspected stock, and quite acceptable to the producers. A profitable business is becoming established, which promises to materially increase in volume within the next few years.

The work was conducted as usual with the valued co-operation and assistance of the officials of the various provincial Departments of Agriculture, who in several instances place the services of trained and experienced men at our disposal during the periods of field work and tuber inspection.

For the coming year it is again proposed to send out forms of application for inspection to all potato growers on our mailing list, inviting them, in the event of their requiring the service of an inspector, to fill in the forms and return them by a given date. Any grow-

THE AGRICULTURAL GAZETTE OF CANADA

ers who have not yet participated in the benefits derivable from this service, and whose names are consequently not on our mailing list, should communicate

with the Dominion Botanist, Central Experimental Farm, Ottawa, who will give every attention to such communications.

THE SEED GRAIN PURCHASING COMMISSION

THE Consolidated Balance Sheet of the Seed Grain Purchasing Commission to November 30, 1921, is presented herewith. The profits shown have been approximately sufficient to pay the operating expenses of the Commission and interest on the money while employed by them, so that it may be said that this Commission has not been in any sense a charge on the public funds.

It is of greater importance, however, that, throughout the period of war and since, this division of the Seed Branch has served to protect Canadian agriculture against seed shortage of any of the staple kinds of seed grain. Further, all of the seed grain purchased and sold by

the Commission has been on the basis of established grades for seed grain and subject always to inspection certificates, and no seed has been sold that has not been properly tested for purity and vitality. The officers of the Seed Branch who have been employed in this work since 1916 had been in the service of the Seed Branch since 1906.

It is not as a rule expected of civil servants that they will enter into merchandising work of this character and make a financial success of it from year to year, particularly during periods when most private business firms with kindred activities have found it difficult to avoid a debit balance with their yearly operations.

BALANCE SHEET 1916-1921, AS AT NOVEMBER 30, 1921

ASSETS—

Cash in Bank	\$ 244 26	
Accounts Receivable—		
Canadian Pacific Railway Co. <i>et al</i> (Freight Rebates)	163 84	
Stock on Hand (Grain and Sacks)	308,645 65	
		\$309,053 75

LIABILITIES—

Advances by Department of Agriculture	\$16,171,540 96	
Less Amount refunded to the Receiver General	16,122,169 42	
		49,371 54
Surplus, 1916-1921		\$259,682 21

WESTERN RYE GRASS

Greatly Increased Yields Obtained from Recent Selections

THE importance of Western Rye grass to the farmers of Western Canada is comparable to that of timothy in the East, and the fact that this native grass is found in a wild state in a large number of forms makes

it a promising species for study by agricultural scientists. The experts of the Dominion Experimental Farms have of late given it more systematic attention than any other grass, and the results that are likely to follow their investiga-

tions promise to be of great practical importance. In his report for 1920-21, Dr. M. O. Malte, until recently the Dominion Agrostologist, announces the discovery that this grass is normally self-fertilized, whereas grasses in general are open-fertilized. The fact that wheat is self-fertilized has made possible the production by scientific breeding of improved varieties such as Marquis. Now that it has been established that Western Rye grass is normally self-fertilized, it will be comparatively easy for the hybridist to originate countless new varieties which will be constant in their characteristics, or in other words, will breed true to type. For this work the plant breeder already has at hand in nature a large number of different types of this grass to work with. By combining and recombining the various characteristics found in them, new varieties can be produced, which will remain constant from one generation to another, and from which selections may be made. In the pursuance of this work a number of wild forms have been collected from practically all of the Provinces. Plots from these were established, with the result that last year some 150 lots of Western Rye grass were being grown at Ottawa for the purpose of studying their relative agricultural value. In 1920, seven varieties were sent for further test

on the prairie farms, while in 1921 five additional varieties were sent out to the same farms.

Between these varieties an astonishing difference in yielding power has been already observed. The fact that, in 1920, one gave only 12 pounds 5 ounces of straw and seed from 300 plants, while another produced 109 pounds 5 ounces will indicate the wide range of productiveness. Results for 1921 are not complete, but the difference in yielding capacity of various varieties was even more striking. It is well within the mark to say that the maximum yields were more than five times as great as the yields of varieties commonly grown. Analyses made by the Dominion Chemist to determine the varieties having the highest percentage of nutritive constituents show that the difference in this respect is also very marked. The inference is that by the simple propagation of the high yielding variety and its introduction to agriculture the increase in productiveness of this valuable plant would correspond; and it should be mentioned that one variety which showed up particularly well in 1920 was sown in 1921 in a field plot for seed propagation. The field of cross-breeding has not yet been entered upon, but apart from that, the above facts are in themselves of the greatest significance to western farming.

THE GRIMSBY PRE-COOLING AND EXPERIMENTAL FRUIT STORAGE WAREHOUSE

THE Grimsby Pre-cooling and Experimental Fruit Storage warehouse has been sold to the Growers' Cold Storage and Ice Company, Ltd., Grimsby, Ont., the transfer having been completed on January 31, 1922.

This warehouse was erected in 1914 and has been operated during the intervening years by the Dairy and Cold Storage Branch. It was planned for the purpose of demonstrating the value of the pre-cooling of fruit for immediate

shipment, and for the study of the best method of applying refrigeration for this purpose. It also provided facilities for conducting experiments in the cooling and refrigeration of fruits, testing the value of different storage periods at different temperatures, the rate of cooling in different packages, and other similar lines of work, the results of which have been published in bulletin form.

Using the warehouse as a base, experimental shipments were made to dis-

tant markets, and different types of refrigerator cars were tried out. It was in shipments from the Grimsby plant that the suitability of properly filled brine tank cars for the long carriage of tender fruits was first demonstrated in Canada. Growers using the facilities offered at this warehouse have been enabled to extend their markets by shipping tender fruits to much greater distances. Certain varieties of fruit can now be shipped successfully to Winnipeg and other western markets, which formerly had to be disposed of in markets nearer home.

The fruit growers have all learned to appreciate highly the advantage of having a place where tender fruits could be held while a carload was being accumulated, over week ends, and during periods of temporary glut on the market. The warehouse also proved to be a great boon to the canning industry, and indirectly to the producers, who were able to store berries and other

fruits for a week or ten days when, owing to weather conditions, they were being delivered in quantities in excess of the capacity of the canning factories. Many thousands of dollars worth of fruits have been saved from complete loss under circumstances of that kind.

The fruit growers of the Grimsby district are so convinced of the absolute necessity of cold storage facilities for the successful handling of tender fruits that a strong company has been organized among them to take over the plant.

The warehouse was originally equipped with what is known as Cooper's Gravity Brine System. At the time it was erected this system had certain advantages, but these have entirely disappeared under the changed conditions since 1914. The new company has equipped the warehouse with mechanical refrigeration and ice-making facilities. The capacity of the warehouse will be practically quadrupled under the new arrangement.

THE ENLARGEMENT OF THE FINCH DAIRY STATION

THE Finch Station, operated by the Dairy and Cold Storage Branch, is being enlarged to take care of the constantly increasing supplies of milk. The station was established in 1912. In that year the total supply of milk received was 2,069,281 pounds. The quantity received in 1921 was 6,586,485 pounds. Part of this increase comes from additional suppliers who have joined the factory since it was first started but the bulk of the increase is due to greater production on the part of the original suppliers. New patrons have not been encouraged to leave surrounding factories except during the winter months when these factories are closed. The Finch Dairy Station is equipped to manufacture cheese or butter and to ship milk or cream according to the demands of the market. It has never been closed for a day since it was started in the spring of 1912. The supply of

milk during the winter months is now six times greater than it was at first. The station is operated as a regular commercial factory. Full rates are charged for manufacturing.

Its growth and development shows how the dairying industry is encouraged by good management and by providing the necessary equipment to operate the year round and to turn out the product commanding the highest relative price for the time being.

At the annual meeting of the patrons of the Station, held recently, a motion to authorize the Department to charge higher rates for the manufacture of cheese and butter and the handling of milk and cream was approved without a dissenting voice. It was admitted that the special equipment which enables the management to manufacture butter or cheese or to sell milk or cream at a moment's notice should be recognized in the rates which are charged.

THE SIXTH DOMINION FRUIT CONFERENCE

IN accordance with resolutions passed by the various Provincial Fruit Growers' Associations, the Minister of Agriculture called the Sixth Dominion Fruit Conference to meet in Ottawa, February 22, 23 and 24 last. Of the thirty-two official delegates, twenty represented fruit growers and fruit growers' shipping organizations, while twelve were chosen by the allied industries in the following proportion:—

Wholesale Fruit Trade.	6
Package Manufacturers.	3
Jam Manufacturers.	1
Nurserymen.	1
Retailers.	1

That the importance of this Conference was appreciated is evidenced by the fact that additional representatives, including members of the Provincial Departments of Agriculture, of fruit growers' organizations and shipping organizations, officers of the railway and express companies, package manufacturers, etc., were present, and far outnumbered the official delegates, so that the attendance throughout the Conference ranged from one hundred to two hundred and over. Mr. C. W. Baxter, Dominion Fruit Commissioner, acted as Chairman.

Practically all the subjects that came up for discussion had been considered at the recent Provincial Annual Meetings, and the delegates were in a position to present the views and recommendations of their respective districts and interests in a comprehensive manner, making it possible to get through a large amount of business. While

some of the subjects on the agenda, as for instance the adoption of the Western States grade names for apples in boxes and the change in the size of the berry and currant boxes, were of a somewhat contentious nature, a marked spirit of co-operation and willingness to sacrifice provincial prejudices was apparent throughout the three days' deliberations.

A matter of far-reaching importance to the industry was the proposal to organize a National Horticultural Council, which received unanimous support. The creation of a Dominion Bureau of Markets was also approved. Many transportation problems were dealt with. Considerable attention was given to by-products, the Conference passing a resolution recommending assistance in marketing for the canning and jam industry, asking that the legislation with respect to the manufacture of jams and jellies be more strictly enforced, and that legislation be enacted prohibiting the use of chemicals in the preparation of beverages, such as cider, fruit juices, wines, etc.

The question of grades for tender fruits in open packages was discussed, but no legislation recommended, it being felt that progress could be made by the optional use of grades for a few seasons under the direction of the Fruit Branch. A resolution was introduced urging that the Fruit Branch assist the blueberry industry by giving an inspection service, and many other matters pertaining directly or indirectly to the industry received attention from a Dominion-wide point of view.

CONFERENCE ON THE GRADING OF DAIRY PRODUCE

A conference of dairy interests was held at Ottawa early in March last by the Dominion Dairy and Cold Storage Commissioner, Mr. J. A. Ruddick, to consider the adoption of regulations for the official grading of

butter and cheese under the provisions of the Dairy Produce Act of 1921. The Act referred to empowers the Dominion Department of Agriculture to compel the grading of dairy products intended for export, but does not become oper-

ative until such time as regulations in regard thereto have been duly authorized.

The conference included representatives from all the cheese and creamery butter sections of Canada, as well as from producers' organizations, buyers, exporters, provincial and Dominion officials, and others interested in the export of dairy produce.

After discussing the matter in all its bearings, the conference expressed its approval of the adoption of the principle of official grading, leaving it to the Department to draw up such regulations as the circumstances called for.

The Dairy Commissioner submitted to the conference for consideration the definitions and standards for grades of cheese and butter that have been in use in Canada since the conference of 1918. After full discussion by special committees these standards were adopted with slight revision.

The conference formally expressed its appreciation of the opportunity accorded for discussing the various problems connected with the enforcement of the Dairy Produce Act. Grading for export is expected to go into effect about May 1.

COMPOSITION OF STOCK FOODS

THE Seed Commissioner of the Dominion Department of Agriculture, Mr. Geo. H. Clark, states that the adulteration of commercial stock foods is still quite prevalent, making it desirable that care and discrimination be exercised by farmers in purchasing them. While the bulk of the feeds on the market are as represented, there are still far too many that are fraudulent, or are misleadingly named, or contain materials unsuitable for feeding purposes. The following four typical examples are given:—

A feed recently offered for sale as barley meal at \$4 a bag was found to contain no barley but to consist of ground corn, sorghum, bean meal and ground oat hulls. "Feed Flour" at \$4.50 per bag was found to consist of ground rice hulls, pulverized oat hulls, with some sorghum and corn. "Feed," the kind not specified, was found to consist of ground oat hulls with a vital weed seed content of 1,870 per ounce. "Ground Oil Cake" was found to con-

sist of ground cocoa shells, a little linseed meal and barley flour.

Microscopical examination is necessary to determine the composition of a stock feed, as the naked eye cannot distinguish the materials present, particularly when they are finely ground. The Feeding Stuffs Act, administered by the Branch is intended to stamp out fraudulent practices in this connection and to protect buyers. Samples of feeds that show evidence of adulteration should be forwarded to the Seed Commissioner, Ottawa, together with all possible accurate information. The results, if need be, together with the information supplied, will be promptly issued for the special consideration and action of the inspector for the district where the article was manufactured or imported.

The capacity of the Ottawa feeding stuffs laboratory for the micro-analysis of feeding stuffs is about ten samples per day. The fee is one dollar for each sample examined, and entitles the sender to the analysis for his own information or for court action.

THE DOMINION EDUCATIONAL BUTTER SCORING
CONTEST FOR 1922

THE plan of the contest will be the same as that for 1921. It is suggested that the provincial authorities in selecting creameries to take part in the contest should, as far as possible, arrange for creameries, or rather butter-makers, that have not taken part in any of the previous contests to participate.

(1) The contest will cover the period from May to October inclusive.

(2) The sample (a 14-pound box of butter), must be made between the 1st and 15th of each month and shipped by express, charges collect, to the "Dairy and Cold Storage Commissioner, c/o Lovell & Christmas, Montreal, Que.," to arrive on or before the 20th of the month.

(3) The Provincial Dairy Commissioners are asked to select a different

creamery each month to participate in the contest and to advise the creameries of the selection. Each creamery participating will send only one sample.

(4) Blank churning record forms and full shipping instructions will be mailed from Ottawa to each creamery participating as soon as the names and addresses are received.

(5) The butter will be scored a few days after arrival in Montreal, and copies of the churning records and scores will be sent to every buttermaker in Canada.

(6) It is presumed that the creameries will be able to procure the 14-pound boxes. If there should be any difficulty in getting them, the Dairy Branch, Ottawa, will furnish them at cost on application.

PART II

Provincial Departments of Agriculture

AGRICULTURAL INSTRUCTION IN NOVA SCOTIA

Particulars of work performed under the Agricultural Instruction Act during the First Nine Years of Operation

BY DR. M. CUMMING, SECRETARY FOR AGRICULTURE

IN each annual report issued since 1912 of the Secretary for Agriculture of the province of Nova Scotia, a somewhat detailed statement has been published dealing with the expenditure under the Dominion Agricultural Instruction Act in that province. Since these reports are all preserved and are easily accessible, we plan in this contribution to give just a brief résumé of the work that has been accomplished by the use of funds provided under that Act, and to refer any who may desire further details to the aforementioned provincial records.

To begin with, the grant has not taken the place of former provincial appropriations for, during the period in which the Agricultural Instruction Act has been in force, the annual provincial expenditure increased from \$75,779 in 1911 to \$118,162 in 1920, and to \$146,390 in 1921, this latter amount including, however, an extraordinary expenditure for the balance of payments in connection with the "Greater Production" campaign of war times. The different expenditures under the Federal appropriations are herewith set forth under the general broad divisions to which they were applied.

The Agricultural College

A relatively large portion of the Agricultural Instruction Act money has been spent to provide for a necessary development in the Agricultural

College which, before the grant was given, was a comparatively small and quite inadequately equipped institution. An addition equal in size to the original structure was made to the main building and a new horticultural building with greenhouse was erected at a cost of approximately \$50,000, which was paid outright from the grants of 1912 and 1913. In 1914 a Science building was erected and equipped at a cost of \$118,000 and since that time interest and sinking fund payments have been made annually. The capital debt now stands at \$96,000.

In addition to the foregoing capital expenditures, a sum varying from \$20,000 to \$24,000 has been annually spent to provide for an increase in the staff of the college as well as to afford further opportunities and facilities for work. Four new heads of departments with assistants were appointed, so that to-day the institution is well equipped and well balanced, and is recognized in the three Maritime Provinces from which students come, as offering as good facilities for work as any agricultural college in Canada.

It may be considered by some that the spending of such a considerable proportion of the grant on this central institution is not entirely within the intention of the Act. But if any one entertains this view, it should be answered that, under the conditions prevailing, where the territory is relatively small and the instruction con-

THE AGRICULTURAL GAZETTE OF CANADA

fined to a two-year course, the members of the staff are engaged in extension work to almost as great an extent as in the purely centralized college work. This has been made possible by relieving for extension work, men who were formerly tied down practically all their time to routine college work. The facts are that the result of this development, made possible through the Agricultural Instruction Act appropriation, is a more efficient college which has become a vital factor in every branch of general agricultural development in the province.

Dairying

The Dairy Division of the Provincial Department of Agriculture was organized after the passing of the Agricultural Instruction Act, and the major part of the current expenditure of this division has been paid out of the grant. When the division was formed in 1912, organized dairying in Nova Scotia was a very small business. The total output of butter from the then existing factories was less than 200,000 pounds. Last year it was over 3,000,000 pounds, and while this large increase was not all due to the departmental staff, still those who are conversant with the situation recognize that the Superintendent of Dairying and his assistants have been large factors in this development. If there is any one line in which the Agricultural Instruction Act has outstandingly scored in the province of Nova Scotia, it is in respect to the assistance it has given to the development of dairying.

County Representatives

The Agricultural Representative branch has also been organized since the Act came into force and paid for entirely from funds provided under this Act. To date, however, the work has not been developed to as great an extent as have some of the other programmes. Five representatives have

been employed each season on an average, and the services of others have been engaged for shorter intervals to carry out specific objects. Apart from general organization work, some of the special lines in respect to which tangible results are now forthcoming in those counties where representatives have operated, have been the growing of clover seed, the dipping of sheep, the spraying of potatoes, the growing of turnips in certain communities where the value of this crop and the most expeditious methods of cultivation were not realized, the demonstration of methods of using various fertilizers, the organization of communities to take advantage of established creameries, and the organization of a considerable measure of co-operation in buying and to a lesser extent in selling. One feature which any one might have anticipated has been clearly demonstrated, namely, that the individuality of the representative counts for more than the system under which he works. It is hoped that this branch of agricultural activity will be more strongly developed in future years.

Poultry

The greater part of the expenditure in connection with poultry improvement has been assumed by the Provincial Department, but definite lines of work have been carried on through the use of the grant. Twenty-five demonstration poultry houses were erected in various localities on a basis of the department supplying the plans and paying for the material, the parties on whose property the houses were erected supplying the labour. This worked out on a basis of about 60 per cent from the department and 40 per cent for the party on whose property the building was erected. Under an agreement, each building was vested in the private owner, the condition being that he must maintain a good flock and permit visitors to inspect the building.

THE AGRICULTURAL GAZETTE OF CANADA

Co-operative egg marketing was facilitated in several communities, although, it must be stated, with lesser success than has been the case in provinces where local markets are not so easily accessible. The expenses of practically all the educational meetings held in the interests of poultry improvement have been paid for out of this fund, as well as those of organizing a provincial poultry association and the incidental annual cost of carrying on this organization. For several years, eggs from pure-bred poultry were supplied to school children at a nominal cost, and in this way good poultry stock was distributed in many localities and the interest of many youths in poultry raising established. During the present year a two weeks' short course in poultry at Truro and a two days' course at Sydney were paid for, in the main, out of this appropriation. Altogether, a big return has been given to the province from that part of the grant devoted to poultry improvement.

Soils, Crops and Drainage

Prior to the funds provided under the Agricultural Instruction Act being available, the college at Truro had only the partial use of a chemical laboratory at the Provincial Normal College, with the result that little work of a systematic character was done in respect to soil studies. However, when the Act placed at our command increased funds, a chemist and later an assistant were added to the staff, and when the Science building was completed, excellent facilities were placed at their disposal for carrying out a comprehensive programme. The following are some of the more important lines of work attempted, all being financed out of the Federal grant:—

(1) A fairly complete soil survey of the province was made, including a chemical and physical analysis of several hundred representative soils.

(2) Soil acidity determinations, made in connection with the survey, revealed a deficiency in the lime content of practically every soil analysed. Consequently extensive experiments were carried out in several localities to ascertain and demonstrate the value of ground and burnt lime to ameliorate this condition. In carrying out this programme a portable lime crusher was operated for two years in certain outlying sections where farmers did not have access to ground limestone supplies. This paved the way for the subsequent operation by private parties of several portable limestone crushers.

(3) Numerous limestone deposits from many sections of the province were analysed.

(4) Marl deposits were located at several places, especially in the Island of Cape Breton, from which parties are now securing marl with a content of from 60 to 90 per cent of carbonate of lime, at a mere fraction of the cost of the machine-ground product.

(5) Experimental demonstration plots were established at several localities for the purpose of studying and demonstrating the fertilizer needs of soils.

(6) Since 1920, experiments have been made to determine the value of salt for soil improvement purposes, the source of supply being the Malagash salt mines, recently discovered and now being operated in Cumberland county.

(7) A division was established in 1912 to make farm surveys and to demonstrate the value and the most expeditious means of farm drainage. This branch of the service was quite extensively developed up to the end of 1914, when Mr. B. H. Landels, the Superintendent in charge, went overseas for military service and fell on Flanders fields. The cost of field tile advanced to such high figures that interest in this branch of work practically ceased. Since that time, a few surveys have been made annually by other members of the college staff, but activities have been very much

reduced in comparison with 1914 and immediately preceding years.

(8) Judges in connection with the various field crop competitions and demonstrations were supplied. These did a great deal to promote the improvement of such field crops as oats, wheat, potatoes, and to a lesser extent, clover.

Fruit Growing

In 1901, the Provincial Department of Agriculture inaugurated a system of so-called Model Orchards in counties lying outside of the recognized fruit belt. When the grant became available, this service was supplemented by instituting a number of demonstrations in the improvement of old and neglected orchards, and also by demonstrating the practicability of vegetable gardening in certain parts of the country where this branch of horticulture had hitherto been neglected.

Finally, to facilitate the publication and distribution of a complete report of the Nova Scotia Fruit Growers' Association, a grant of \$300 was paid annually to that association, with the result that much greater publicity was given to its valuable deliberations.

Entomological Work

One of the first appointments made after the Agricultural Instruction funds became available was that of a Provincial Entomologist. Subsequently, several field assistants were appointed. Part of the expense of the service has been paid out of provincial funds, but the major part has been paid out of the grant. A brief résumé of the services rendered by this division is as follows:—

San Jose Scale.—Found very widespread in 1912, Annapolis and Cornwallis Valleys, 723 cases 1912; 57, 1913; 3, 1914, 6, 1915; none since. Much better nursery stock now being imported as a result of work. In 1914 about one half stock entering province was infested

with scale; in 1921, none. Advantage was taken of inspection to make complete census of fruit industry with respect to acreage, treatment for pests, etc. Information filed, card catalogue system.

Brown-tail Moth.—1913-14, 24,156 nests taken; about 1,000 in 1921-22. Effort to keep moth in check until public are informed as to methods of control and until parasites are established; also to wipe out outbreaks on wild land.

Green Apple Bug.—Doing great damage though unrecognized in valley orchards, insect not even described or named at start of our investigations, Biology and control worked out. Coloured chart prepared and bulletin published.

Apple Maggot.—Complete census made and distribution of pest determined. First to demonstrate on large scale that insect could be controlled by poison sprays without use of sweetened baits. Extensive biological studies. Coloured chart and bulletin issued.

Spraying and Dusting.—Seven years of standard orchard experiments to secure data on which to base spraying and dusting schedules. Not yet published.

Apple Sucker.—Pest new to North America discovered. Complete monographic account nearing completion. Coloured chart and bulletin in course of preparation and further extensive practical work and demonstrations now under way.

Vegetable Insects.—Too much to report fully under this. Most notable success with cabbage maggot. Fully demonstrated efficacy of corrosive sublimate for early cabbage and cauliflower, confirming work at Ottawa and Guelph; also working out treatment for seedlings. Other satisfactory remedies secured, which it is hoped will have some application to pest control. Illustrated bulletin in course of preparation.

Hand Book of Nova Scotia Insects.—Notes, illustrations (several in colour)

in course of preparation. To be a standard work for rural teachers, farmers, gardeners, fruit growers, etc. Over 700 photographic illustrations and many line and wash drawings prepared for above.

Lantern Slides, etc.—Many coloured slides made for farmers' meetings, short courses, etc. Many demonstration mounts for exhibitions and short courses prepared, illustrating all stages of common insects and giving directions for control.

Bee-Keeping. — Directed extension work in bee-keeping and the campaign against American foul brood. This disease was widespread in 1914; many cases treated. Only one case discovered in 1921.

Short Courses

Commencing in the year 1914, from three to six short courses of an average duration of three days each, have been annually conducted, and paid for out of the grant. To facilitate the holding of these courses, special grants have been paid to communities that agreed to contribute funds for the purpose of erecting new buildings or modifying old buildings to properly house the short course sessions. Such grants have to date been given in the following communities: Yarmouth, Bridgewater, Lawrencetown, Shubenacadie, Stewiacke, Musquodoboit, and Antigonish. The courses have been uniformly largely attended, commencing in 1914 with an average daily attendance of 125, and increasing in subsequent years to 200. This must be regarded as an unusually large response to efforts made to carry agricultural instruction outside the college hall. Satisfactory buildings have been to a considerable measure responsible for this outstanding success, but it should be added that no pains have been spared to provide the best teachers available and to make the courses as profitable and popular as possible. This is a service we would like to extend, but as the majority of the teachers have been members of the Agricultural College staff, it has been found

difficult to spare them for any greater length of time in any one year.

Women's Department

The Women's Division was organized in 1913, and all expenses have been paid out of the grant. A superintendent was appointed in 1913, and temporary assistants have been added from time to time since. Fourteen women's institutes were organized during the first year. This number has now been increased to 76 with a membership of over 2,500. The activities of these institutes have been devoted to many laudable objects, including, during the war, the popularizing of home canning and other methods of conserving food, the giving of substantial supplies and money, including a motor ambulance to the Red Cross. Since the close of the war, some of the outstanding lines of activity have centered around the building of community halls and other local improvements, the encouragement of school exhibitions, school libraries, improving the sanitary condition of schools, the facilitating of hot school lunches, etc. Practically every activity which may be undertaken by women who are interested in community improvement has been at least commenced and in many cases carried on to successful conclusion by the women's institutes of the province.

In addition to the foregoing two short courses in home economics and allied subjects have been annually conducted at the Agricultural College:—(1) A midwinter course for girls and women of all ages, and (2), a girls' course in the month of July. Several two-day short courses in home economics have been conducted at local centres, and numerous meetings have been held in every part of the province.

A summer Women's Institute convention has been held annually at the Agricultural College, attended by delegates from practically every institute in the Province. One delegate from each institute receives one-half of her

THE AGRICULTURAL GAZETTE OF CANADA

train fare and \$2 per day towards living expenses. Each institute receives an annual grant of \$5.

General

In addition to the foregoing branches of activity, financed by the grant, small appropriations have been annually set aside for certain miscellaneous purposes such as securing films for moving pic-

tures, the holding of special meetings, and the paying of incidental office and other routine expenses. However, the foregoing constitute the major branches of activity. But one other branch of the service remains, and that a most important one, namely, the assistance given to school work in the province. Upon this matter the Director of Rural Science for Nova Scotia, Mr. L. A. DeWolfe, presents the report ensuing.

RURAL SCIENCE IN NOVA SCOTIA SCHOOLS

BY L. A. DeWOLFE, M. Sc., DIRECTOR

After nearly nine years of Rural Science in the schools of Nova Scotia, a brief survey of attempts and accomplishments is in order. Through the assistance of the Federal grant of 1913, we have been able to do much that could not otherwise have been attempted.

It must be noted that, in this province, the work has been administered by the Department of Education, though the funds were supplied through the Department of Agriculture. Such a system has both advantages and disadvantages. Agriculture is more popular than education, which gives that department a distinct advantage. On the other hand, many of the administrators of the Education Department, being conservative in their proclivities, do not heartily support innovations introduced from an outside source. Because of this attitude, progress is slower than it should be.

Pioneer Work

Throughout the past nine years our interests have necessarily several times changed ground. Among our earliest efforts, besides gardens and exhibitions, were the introduction into rural schools of practical health teaching, including the hot noon lunch. In a short time, however, the Women's In-

stitutes came on the stage, and have largely relieved us of the hot lunch propaganda. In the same way, the newly organized Public Health Department has taken over our health teaching. Of course we still co-operate with these organizations wherever possible, and we introduce their work in regions they have not yet reached.

Exhibitions

School exhibitions and school clubs have been successful. In the former, the Women's Institutes are also becoming active; but not more than one-eighth of our annual fairs have yet come within their scope. No outside organization has yet touched school clubs, with the exception of poultry and live stock clubs. These have been managed directly by the Departments of Agriculture—poultry by the provincial department, and live stock by the federal department. Garden clubs, school improvement clubs, sewing clubs, and debating clubs exist in about 200 rural schools. Since 1913, school fairs have increased from four to two hundred. Where only six schools exhibited their produce in 1913, 450 schools exhibited in 1922.

Every county exhibition gives a prominent place to children's exhibits of farm produce. At Bridgewater,

Stewiacke, Shubenacadie, Yarmouth, and Antigonish, the school department is the biggest single feature of the annual county exhibition. Before 1913, "Children's Department" meant only writing and drawing. Now, vegetables, flowers, woodwork, cooking, canning, and sewing are common exhibits. Our efforts are now directed towards improving the educational standard of our exhibitions. This, we are glad to say, has already improved wonderfully.

Gardens

School garden work has also given gratifying results. Under the Macdonald Consolidated School Movement, school gardens were well established 15 or 20 years ago. Later, with changing teachers, the work deteriorated. Since 1913, however, it has been revived; though along new lines. We found that the home garden was much more easily handled than the garden on the school grounds. At present about 5,000 school children each year make home gardens under school direction. Our teachers, too, have learned to make these gardens the basis for many regular school lessons.

Teacher Training

Our greatest opportunity, however, lies with the teacher-training work in the Normal College at Truro. It is fortunate that the Director of Rural Science is also an instructor in the training school, where he comes in contact with the future teachers, can present his point of view, and knows in advance what to expect of each teacher. The Summer School, too, affords a similar advantage with a new group of teachers. The Summer School costs about \$4,000 (one-third of our total allowance), but it is undoubtedly money well spent. In regular Normal College classes, every student does practical work in seed germination, seed testing, grafting, potting, shifting, soil physics, and chemistry,

fertilizers, hot-beds and cold-frames, farm and garden botany, and practical garden work. Our large school garden is intensively worked, and all students have a share in the work. Two large greenhouses afford good laboratories during the winter months. Last year we gave away, through teachers, from our school garden, flower seeds which, if purchased, would have cost fully \$200.

Travelling Teachers

For two years we carried on, in a small way, the most effective experiment of our whole experience. This was a system of travelling rural science teachers. We had observed that inexperienced teachers often failed to grasp the significance of our teaching, or were unable to introduce new subjects. Accordingly we appointed a half dozen capable teachers, each of whom travelled over a district of about twenty schools, returning to each school once in two or three weeks. For lack of funds we had to drop the work, but even yet we are frequently asked when such a system will be renewed. The state of New Jersey now uses the same system, but it applies it to regular school subjects; and it is pronounced "the finest educational effort in the United States." It is certainly greatly needed in Nova Scotia.

Under the leadership of the Travelling Teachers, garden clubs, exhibitions, school improvement clubs, canning clubs, milk-testing clubs, etc., received new impetus. At one district exhibition, the children displayed 700 jars of canned vegetables and fruit. This work was done under the travelling teacher's supervision during vacation and after school hours. Such work would have been practically impossible without a special teacher. The same teacher conducted a very enthusiastic sewing and wood-working club.

In another district, stock-judging and milk-testing took precedence over other activities. There a community

exhibition was organized where both children and grown-ups brought their produce. In a third instance, the school parade and school sports brought the whole community to the fair; and the travelling teacher took advantage of the opportunity to address the audience on the needs and aims of a modern school. Another efficient special teacher demonstrated the relating of all regular school subjects to home projects. This one demonstration was worth many times what it cost.

In the same way, others reached their goal through school health, hot-beds, etc. It is worthy of note that one community club organized three years ago is still in existence, and is hopefully awaiting the time when another travelling teacher will come to replace the one removed two years ago. Thus the influence of those good teachers remains, though they were in the field a comparatively short time.

May we further note with satisfaction the fact that these special teachers secured the active support of agricultural societies in their work.

Material Aids

Among material aids in our teaching, we are well supplied with up-to-date reference books. We also circulate among our best teachers, books and magazines on the short monthly circuit plan. This greatly assists those who cannot afford to buy books for themselves. At our Normal College, we also have a Pathescope moving picture machine, a lantern, and a good supply of microscopes. We occasionally borrow slides and films from the International Harvester Company by paying expressage, in addition to regular films from the Pathescope Company and from the Agricultural College. We also have published a four-page "Rural Science Bulletin" once a month since 1915.

Recreation

Realizing that the underlying cause of our young people leaving the farms was not so much the difficulty of *making a living* as it was the *monotony of living*, we very early introduced plays, games and community recreation through the teachers. School games calling for teamwork were stressed, and every Normal trained teacher left Truro with some sort of a vision of what her community duties were. She was trained not only in school games, but community entertainments. We have ample proof that such activities proved popular; and teachers assure us that, through play, they have been able to teach many useful lessons. Miss Dora M. Baker, Associate Director of Rural Science, has been wholly responsible for this phase of the work; and she has rendered efficient service. No department of our training school receives so many requests for help from former students as that presided over by her. She has taught our teachers the value of dramatization, as applied to school subjects and to rural life.

Drawbacks

No system has yet attained ideal conditions. In Nova Scotia, we meet certain difficulties that are common to all provinces. In addition we have the conservatism of the East, and well established tradition to fight against. The newer West has no tradition. There, a spirit of optimism prevails. Here, our educational system is wedded to tradition.

Our greatest drawback is the youth and inefficiency of our teachers. Coupled with that is a lack of interest in schools on the part of the public. While modern methods have been applied to every other phase of farm life, there is no serious demand for a modern school. This is because our teachers and other educationists have not educated the public to the meaning of "modern" in school affairs. The first step towards

THE AGRICULTURAL GAZETTE OF CANADA

remedying such a condition, is to require students to submit results of, and certified reports on, some project work in agriculture, instead of book examinations, as at present. We are directing our efforts towards this goal at present; but progress is slow.

Summary of Results

In spite of the foregoing drawbacks, we have no reason to be discouraged. To show in tabular form what we have accomplished along lines that lend themselves to statistics, I submit the following:—

Activity	No. of Schools, 1913	No. of Schools, 1921
Hot Noon Lunch..	0	100
Applied Hygiene..	20	300
Local School Fairs..	4	200
Schools represented at Local Fairs..	6	450
County Fairs carrying School Departments..	0	8
School Clubs..	0	260
Home-School Gardens..	0	5,000

The annual allowance of \$12,000 for Rural Science work is distributed in round numbers about as follows:

Teacher-Training, Summer School (Salaries, Bonus, Travelling)	\$ 4,000
Teacher-Training, regular Normal Course (Salaries)	4,000
Travelling (Rural Science Director)	600
Office and garden maintenance	600
Books, Magazines and Equipment	800
Balance, as it accumulates, spent on Travelling Teachers	2,000
	\$12,000

Our teachers have inherited a narrow interpretation of the school curriculum. To them, every subject is a book subject. Practical work has not been a part of their early professional training. For that reason, I believe it is most desirable that we employ an efficient body of

specially trained travelling rural science teachers to supplement the work of the regular teacher. Our experience has proved the soundness of this policy. A general grant for such a purpose would, I am sure, bring more tangible results than any other agency we have yet tried.

THE AGRICULTURAL INSTRUCTION ACT IN MANITOBA

BY JAS. H. EVANS, DEPUTY MINISTER OF AGRICULTURE

IN carrying on extension work in Manitoba the principle adopted at the beginning was that practically all of the funds provided under the Agricultural Instruction Act should be expended in the rural districts. To that end a general programme was mapped out under the following divisions:—

- Home Economic Extension;
- Agricultural Representatives;
- Boys' and Girls' Clubs;
- Extension Schools;
- Community Meetings.

Under Home Economics was included demonstrations in cookery, canning and home nursing, and dressmaking and millinery short courses. Commencing with a staff of one in 1914, the work gradually increased until at the present time seven specialists are employed as follows: four dressmaking, two millinery, one cookery and one in charge of this branch of the work.

During the past year, 144 dressmaking courses were held with a total enrolment of 2,186, and 79 millinery courses with an enrolment of 1,825.

THE AGRICULTURAL GAZETTE OF CANADA

The following figures taken from the 1921 annual report will give some idea of the advantage of this kind of extension work from an economic standpoint. "The total cost of the short courses was, salaries \$7,900, railway and hotel expenses, \$5,366, or a total of \$13,166. Value of completed garments, etc., less cost of materials, \$27,565; total gain \$14,391."

In 1917 when a Public Health Branch was established, home nursing was discontinued by the Extension Service.

Agricultural Representatives

In 1915, six Agricultural Representatives were appointed, but by the end of 1916 all of them had either enlisted or had returned to the home farm to take the place of some other member of the family who had gone overseas. No effort was made until the close of the war to further develop this branch. At present there are six agricultural representatives with a Director in charge, and additions will be made as rapidly as men can be secured who have the required training and the correct view point for this kind of work.

The aim at present is to limit the territory in which a representative operates to from ten to fifteen townships—a township being six miles square. This enables him to take care of all phases of agriculture within this area, such as live stock improvement, boys' and girls' clubs, weed control, and occasionally to act as secretary of the Agricultural Society and other organizations of an agricultural nature.

Home Demonstration Agents

The first permanent Home Demonstration Agent has just been appointed. She will have her headquarters at Roland and will be assisted in developing her work by a Home Bureau which will have in its membership representatives from the Trustees Association, Teachers' Association, Women's Institutes, United Farm Women, Municipal Councils, and

other recognized organizations working for community improvement.

Miss Thordarson, the young woman appointed to this office, is a graduate of the Manitoba Agricultural College, having taken the whole five-year course. Miss Thordarson before entering the college was a member of the Extension staff in the capacity of instructor in dressmaking, and during the summers while attending the college she continued to do this work. She will thus be able to effectively handle all the short course work in her territory as well as assisting in Boys' and Girls' club work, produce marketing, teaching home economics to classes in the consolidated schools, and demonstration team work in the rural schools.

Boys' and Girls' Clubs

The first clubs were organized in the spring of 1914 when five clubs were established. There has been a steady development right up to the present. There are now 225 central clubs with approximately 1,600 branches and over 30,000 members. The figures for the past year are as follows: Membership 35,285; 215 club fairs were held at which there were 30,237 exhibitors: attendance, 36,053 adults and 42,877 children, with a total of 130,196 entries, made up as follows: pigs 1,302, calves 1,167, sheep 392, colts 397, dairy 2,497, poultry 5,375, grain 1,443, garden 22,355, cooking 14,784, sewing 13,801, canning 6,123, weeds 2,225, mechanics 2,285, insects 165, specials 1,871, school 54,014.

Possibly the greatest advance was made four years ago when the first demonstration teams were organized. Last year over 1,000 girls took part in this kind of work, and 102 of the girls who made the best showing were given a free trip to Winnipeg, where they competed for Provincial honours. Already (Feb. 15) 1,500 are enrolled in demonstration teams and the following subjects are being studied: Canning, dyeing, laundry, millinery, quick breads, bread, flour, potatoes, milk testing, tex-

THE AGRICULTURAL GAZETTE OF CANADA

tiles, flavouring extracts, beverages, upholstery, eggs, milk, home cleansers, labour savers, table setting, balanced meals, patterns, oils, shoes, flax, rye, oats, corn, macaroni, food chopper, hot lunches, and home decoration.

One hundred and fifty girls will come to Winnipeg next September, and in addition, the State of Iowa is sending its champion sewing team, Minnesota its champion bread baking team, and North Dakota its champion canning team; and it is expected that Manitoba's champion textile team will demonstrate at the Minnesota State Fair.

One hundred and six of the champion live stock boys were also given a trip to Winnipeg, and next September 150 will take the trip.

The success of club work is due to the close co-operation between the Departments of Education and Agriculture and the Agricultural College. The Boys' and Girls' club method of teaching agriculture has been adopted by the Department of Education as the most feasible plan; and from ten to twelve lectures on the conduct of club work are given by members of the extension staff to each class of teachers at the Normal School. The inspector division has been taken as the unit for organization purposes, and the inspector is the club leader for his division.

School and club work is shown at every fair. The inspector judges the school work or arranges for some one else to do so. Judges for the agricultural and home economics work are provided by the extension service, a great deal of this being done by members of the Agricultural College staff. As it is necessary to depend on volunteer local leadership, the Department of Agriculture provides a grant of 50 per cent of the money paid out in cash prizes but not more than 15 per cent of the grant is

available for school work. These grants are paid out of Provincial funds.

Extension Schools for Men

Extension schools, or short courses, have been carried on regularly for eight years during the winter months. These courses extend over a period of from one to two weeks. Gas engine schools have been extremely popular, 108 courses having been held with an aggregate enrolment of over 5,000.

Agricultural courses have been held each year. During the war the attendance was limited owing to the majority of the boys being with the colours. These courses are usually of from ten days to two weeks duration, and two or three instructors have been provided for each.

During the summer holidays a large number of ten day short courses in woodworking were held for the older boys and girls and proved very successful.

Community Meetings

Community institute meetings have always been an effective phase of extension work. Although these meetings were held in every hamlet in the Province, a special effort was made to reach the people living in the newer districts. Lecturers have at times been back from 40 to 45 miles from the railroad. During the past year 380 of these meetings were held with a total attendance of 35,801, and 580 addresses were delivered.

The motion picture has been a very effective part of this work. The Department of Agriculture now owns 14 Victor cinema machines and over 250 films, 25 of which were made in the Province under the direction of the Agricultural College and the extension service. These also were paid for out of Provincial funds.

PROFIT COMPETITIONS CONDUCTED BY JUNIOR ONTARIO FARMERS, 1921

BY W. D. JACKSON, B.S.A., ASSISTANT DIRECTOR OF AGRICULTURAL REPRESENTATIVES

THE value of the various crop and live stock competitions conducted by the Junior Farmers under the supervision of the Agricultural Representatives, is indicated by the increasing number of contestants from year to year and the interest shown by them in the keeping of detailed records. Two hundred and eighty-four young men entered the various competitions last year and the majority of them did very creditable work. Owing to the very unfavourable season, together with the slump in prices, all contestants were not able to show a profit. Competitors who completed the competitions in all details received a valuable training in better farm methods and production costs, although they may not have won a prize or shown a profit on the undertaking.

All competitions were open to young men under 30 years of age who had not won a prize in a competition in previous years. The prize in each competition consisted of railway transportation, board and lodging while attending one of the short courses at the Ontario Agricultural College, Guelph, or the special short course in general agriculture at the Kemptville Agricultural School, Kemptville. Winners in the competitions in Western and Northern Ontario attended the short courses at the Ontario Agricultural College and the Eastern Ontario winners attended the short course at the Kemptville Agricultural School. In all thirty-seven competition winners were provided with transportation to Guelph and Kemptville.

During 1921 competitions were conducted as follows:—

Acre Profit Competitions with Oats 8, Potatoes 7, Corn 1, Turnips 1;

Dairy Profit Competitions 3;

Baby Beef Competitions 4;

Feeding Hogs for Profit Competitions 13;

Total, 37 competitions.

Acre Profit Competitions

Prizes in these competitions were awarded for the largest net profit per acre. Unless six entered and four completed the contest, no prize was awarded. In cases where twelve entered and eight completed the work, two prizes were awarded. The contestants themselves decided on the crop for their competition. In the case of the competitions with oats and barley, each contestant was required to have at least 5 acres of the crop; this enabled him to also enter in the standing field crop competition. For all other crops the area was one acre. Each contestant was required to keep, on forms supplied, an accurate record of all labour, cost of seed, fertilizer and other expenses in connection with producing the crop.

In calculating the cost of production in the various competitions, the following values were used:—

Man labour to be reckoned at 30c. per hour;

Horse labour to be reckoned at 15c. per hour;

Barnyard manure applied to this crop at \$1 per ton or two-horse load;

Barnyard manure applied to previous crop at 50c. per ton or two-horse load;

Commercial fertilizer applied to this crop at one-half of cost price;

Rent of land eight per cent of the selling value of the land, this to be figured by the Representative and the Junior Farmers' Improvement Association;

Plowing, \$4 per acre. This is figured on the basis of hiring a man and a team at the rate of \$6 per ten-hour day.

THE AGRICULTURAL GAZETTE OF CANADA

	<i>Value Seed Used in Planting</i>	<i>Value Product Harvested</i>
Turnips.....	\$0 65 per lb.	\$0 12½ per bushel
Mangels.....	0 50 "	0 12½ "
Potatoes.....	1 00 per bushel	1 00 "
Spring wheat.....	2 00 "	1 20 "
Oats.....	1 00 "	0 45 "
Barley.....	2 00 "	0 65 "
Field beans.....	3 00 "	2 75 "
Field peas.....	3 00 "	1 50 "
Corn for seed.....	2 25 "	0 63 "
Corn for silage.....	2 00 "	5 00 per ton

ACRE PROFIT COMPETITIONS, 1921

OATS—45c. PER BUSHEL

County and Winner	Yield	Value	Cost of Production	Profit or Loss
	bush.	\$	\$ cts.	\$ cts.
Lennox and Addington—				
Cecil Luther, Napanee.....	61	27 45	26 02	1 43
Prescott and Russell—				
Henri Dupont, Curran.....	40	18 00	19 05	1 05 Loss
Bruce—				
Lloyd Hopper, Paisley.....	34½	15 57	16 73	1 16 Loss
Ontario—				
Harold E. King, Cannington.....	43.5	19 57	21 58	2 01 Loss
Middlesex—				
L. A. Baker, Lambeth.....	45.15	30.32	24.08	3 76 Loss
Kenora—				
Melville R. Fisher, Dryden.....	20	9 00	13 19	4 19 Loss
Lincoln—				
J. C. Thompsen, Beamsville.....	32	14 40	19 69	5 29 Loss
Lambton—				
H. C. Nesbitt, Mooretown.....	28.5	12 85	18 30	5 45 Loss

POTATOES—\$1 PER BUSHEL

Timiskaming—				
Chas. H. Thomas, New Liskeard, R.R. No. 1.....	617	617 00	80 20	536 80
Thunder Bay—Port Arthur—				
Conwell Pifer, Kakabeka Falls.....	528	528 00	50 35	477 65
Timiskaming—				
Bruce Irvine, Hanbury.....	506½	506 66	83 37	423 29
Manitoulin—				
Llewellyn Honess, Poplar.....	258	258 00	79 96	178 04
Simcoe—				
Ernest Switzer, New Lovell.....	219	219 00	50 80	168 20
Bruce—				
W. A. Leeder, Port Elgin.....	170	170 00	46 80	123 20
Norfolk—				
Aubrey Adams, Wilsonville.....	131	131 00	73 60	57 40

CORN—63c. PER BUSHEL

Essex—				
R. M. Elliott, Comber.....	53	33 39	29 05	4 34

TURNIPS—12½c. PER BUSHEL

Algoma—				
Chester E. Farmer, Sault Ste. Marie, R.R. No. 2.....	1,230	153 75	79 43	74 32

THE AGRICULTURAL GAZETTE OF CANADA

In computing profit, no allowance was made for overhead expenses, such as interest on investment, charge for machinery, nor for depreciation of any kind.

Dairy Profit Competitions

The Dairy Profit competition extended over a period of seven months. Contestants were required to weigh each milking and to take a two-ounce sample three times a month. These samples were tested and the amount of butter fat determined each month by the Agricultural Representative. Accurate records were also required as in the case of the other competitions and the profit was determined by deducting the cost of feed from the value of the butter fat and skim milk. Prizes were awarded for the largest net profit for a cow or heifer which had not been previously entered in a Record of Performance or other similar yearly test.

In compiling results, butter fat was valued at 62½c. per pound for March, 58½c. for April, 28½c. for May, 27½c. for June, 35c. for July, 40c. for August, 39c. for September, 40c. for October, and 43c. for November. Skim milk 30c. per cwt.

Pasture and feed values were as follows:—

For Feeding Hogs, Baby Beef and Dairy Profit

Pasture.....	\$ 1 per month
Ground Oats.....	35 00 per ton
“ Barley.....	45 00 “
“ Peas.....	55 00 “
“ Rye.....	“
“ Wheat.....	61 50 “
“ Corn.....	40 00 “
Corn on Cob.....	34 00 “
Bran.....	30 00 “
Shorts or Middlings.....	32 00 “
Oil Cake.....	54 00 “
Cotton Seed Meal.....	56 00 “
Gluten Feed.....	50 00 “
Low grade flour or red dog.....	53 50 “
Tankage.....	62 50 “
Hay.....	20 00 “
Alfalfa.....	23 00 “
Straw.....	10 00 “
Silage.....	5 00 “
Roots.....	5 00 “
New Milk.....	35 00 “
Skim Milk.....	6 00 “
Buttermilk.....	4 75 “
Whey.....	3 00 “
Green Feed.....	2 00 “

DAIRY PROFIT COMPETITION, 1921

County and Winner	Value of of Feed	Milk Lbs.	% Fat	Lbs. Fat	Value	Lbs. Skim Milk	Value of Skim Milk	Net Profit
	\$ cts.				\$ cts.		\$ cts.	\$ cts.
Prescott and Russell— Hector Carron, Curran.....	13 76	6,594	4.12	263.55	93 12	6,330.45	19 00	98 36
Grenville— C. Floyd Barber, Merrickville.....	27 07	6,908	3.3	228.6	87 46	6,679.4	20 03	80 42
Dundas (W. Stormont)— Geo. B. Baker, Newington.....	49 21	5,439	4.26	221.95	86 87	5,217	15 63½	53 29½

In this competition no charge is made for labour, interest on investment or other overhead expenses. The profit shown in the value of the butter fat and skim milk above the cost of feed and pasture.

Baby Beef Competition

Prizes in the Baby Beef competition were awarded on the basis of 75 points for quality and finish and 25 points for net profit. Contestants were permitted to enter either pure bred or grade heifers or steers, to start with several calves and discard the less promising

ones as they developed. Calves entered were born after September, 1920, and the competition concluded in November, 1921.

Special prizes are offered at the Ontario Provincial Winter Fair, Guelph, for animals entered in this competition. This feature created considerable interest, and some very excellent animals have been shown in this class at the Winter Fair.

In calculating the net profit, the animals were valued at 9c. per pound, the average price during the marketing season. Feed was valued as follows:

THE AGRICULTURAL GAZETTE OF CANADA

Pasture, 75c. per month; nurse cow, \$6 per month; grain, hay, etc., as for Dairy Profit competition. The cost of production included only the cost of feed, pasture, nurse cow, and the initial cost of the calf at \$5. These points should be taken into consideration when making use of these results.

BABY BEEF COMPETITION, 1921

County Winner and Breed	Date of Birth	Cost of Feed Consumed plus Initial Value of Steer	Weight of Steer	Value	Net Profit	Score
		\$ cts.		\$ cts.	\$ cts.	
Bruce— Harold Cormack, Paisley, Shorthorn Grade.....	Dec. 15, 1920	72 99	1,020	96 90	23 91	93½
Bruce— J. Fraser Scott, Pt. Elgin, Shorthorn Grade.....	Oct. 20, 1920	61 74	750	71 25	9 51	81.3
Wellington— John H. Saunders, Arthur.....	Sept. 8, 1920	60 97	857	81 40	20 44	75½
Huron— Harold Hunter, Exeter, Aberdeen Angus Grade.....	Jan. 6, 1921	114 31	810	76 95	Loss 37 36	64.9

Feeding Hogs for Profit Competition

Each contestant was required to feed a pen of not less than four bacon hogs and to keep accurate records of the feeds consumed from which the net profit per cwt. of gain was computed. The awards were made on the basis of 60 points for highest net profit per cwt. of gain, 20 points best kept records, and 20 points for highest gain in weight except that for light and heavy hogs. Two points were deducted for every 5 pounds over 230 pounds or under 180 pounds. The feeding period

commenced when hogs were 6 weeks of age and continued until they were finished for market and not more than 28 weeks of age. A certificate was required of the weight of the hogs at time of marketing. In arriving at the net profit per cwt. of gain from 6 weeks of age, live hogs were valued at 11c. per pound, the average top market price for six weeks beginning September 1.

Feeds were valued as follows: Pasture, \$1 per hog; other feeds as for Dairy Profit competition.

THE AGRICULTURAL GAZETTE OF CANADA

FEEDING HOGS FOR PROFIT COMPETITION

County and Winner	Length of Feeding Period	Average Cost of Feed per Hog	Average Weight Alive When Marketed	Average Gain in Weight From 6 Weeks of Age	Value per Hog of Grain in Weight	Average Net Profit per Hog	Average Net Profit per Cwt. Gain
		\$ cts.	Lb.	Lb.	\$ cts.	\$ cts.	\$ cts.
Manitoulin— Willie Tustian, Kaga- wong.....	June 8-Oct. 26 140 days....	6 76	196	169½	18 61½	11 85	7 00
Bruce— C. Wilfred Grant, Paisley.....	June 16-Oct. 17 124 days.....	7 89½	220	193½	21 09	13 19½	6 88
Dundas— Mortimer Eastman, Lunenburg.....	March 30-Aug- ust 15—138 days.....	7 06½	195	171	18 81	11 75	6 87
Durham— John S. Cryderman, Bowmanville.....	February 21- July 27—156 days.....	7 19	221·5	171·5	18 89	11 70	6 81
Lambton— Chas. L. Hinks, Mooretown.....	June 15-Sept. 20 97 days....	8 08	192·5	163	17 88	9 80	6 03
Ontario— Walter Kirk, Brook- lin.....	April 23-Nov. 5 196 days....	10 33	212½	187½	20 62	10 29	5 49
Huron— C. A. Corbett, Ford- wich.....	April 29-Octo- ber 3—157 days.....	9 16	200	165	18 15	8 99	5 42
Lennox and Addington— Karl S. Denyes, Odessa.....	April 6-Sept. 10 157 days....	10 53½	206½	186½	20 48½	9 95	5 34
Simcoe South— Cecil A. Newton, Eg- bert.....	June 5-Nov. 2— 150 days....	11 27	213½	191½	21 05	9 77	5 11
Sudbury— Isaac Muncaster, Wal- ford.....	May 11-Oct. 15 157 days....	10 88	212½	183½	20 15	9 27	5 06
Rainy River— Wesley Harron, Emo..	May 14-Nov. 12—182 days	12 53	232½	214½	23 62	11 09	5 00
Grenville— John H. Hulton, Mer- rickville.....	May 20-Oct. 20 153 days....	13.82½	225	202½	22 27½	8 45	4 17
Waterloo— Lorne Roth, New Hamburg.....	July 6-Nov. 18 135 days....	13 02½	178½	152½	16 78½	3 75	2 46

It should be noted that the cost of production in connection with the feeding hogs for profit competitions does not include labour or other overhead expenses and this should be given due consideration when using these results.

The average cost of feed per hog was \$9.89 for the 52 hogs fed by the win-

ners, the average net profit per hog \$9.98, the average net profit per cwt. of gain from 6 weeks of age \$5.51; the average number of days in feeding period 149, and the average gain in weight from 6 weeks of age 181 pounds, or an average gain of 1½ pounds per day throughout the feeding period.

QUEBEC LEGISLATION, 1922

THE agricultural legislation passed at the recent session of the Legislature of the province of Quebec is summarized as follows:—

An Act to amend the Act concerning Farmers' Clubs.—The purpose of this Act is (1) To allow the clubs to pay their secretary a salary amounting to 10 per cent of the gross receipts, instead of 7 per cent as heretofore; (2) To provide for a change in the system of distribution of grants paid to clubs keeping breeding animals, and to change the amount of these grants under the regulations of the Council of Agriculture.

An Act to amend the Act concerning Agricultural Associations.—The purpose of the Act is to enable the associations to pay their secretary a salary amounting to 10 per cent of the gross receipts, instead of 7 per cent as heretofore.

An Act to amend the Act concerning the Improvement of Horses.—This

Act provides for a few slight amendments to the general Act.

An Act concerning Loans made by the Quebec Seed Growers' Agricultural Co-operative Association.—This Act authorizes the Lieutenant-Governor in Council to guarantee certain loans up to the amount of \$70,000 to the said association for the purchase of seed grain for farmers.

An Act to assist certain Municipalities in the purchase of Seeds or Seed Grain.—Under this Act, the council of any rural municipality, or a county council in districts that are not constituted as local municipalities, may borrow money, by note or otherwise, by resolution to this effect, for the purchase of seed grain to sell to farmers, or to lend to farmers to enable them to purchase direct. The amount owed to the municipality by the taxpayers is to be collected at the same time as the municipal taxes and constitutes a first mortgage on the possessions of the taxpayer up to the amount of \$100.

AGRICULTURAL APPROPRIATIONS

	1922-1923	1921-1922
Agricultural Societies.. . . .	\$ 100,000 00	\$100,000 00
Farmers' Clubs.. . . .	65,000 00	100,000 00
Encouragement of agriculture in general including Demonstration Farms.. . . .	450,000 00	350,000 00
The Agricultural and Horticultural Society of Montreal.. . . .	500 00	500 00
Pomological and Fruit Growing Society.. . . .	500 00	500 00
Council of Agriculture.. . . .	3,000 00	3,000 00
Agricultural Schools.. . . .	90,000 00	40,000 00
Establishment and maintenance of a dairy school and intermediate agricultural schools.. . . .	50,000 00	50,000 00
Veterinary Instruction.. . . .	6,000 00	6,000 00
House-keeping Schools (Ecoles ménagères).. . . .	30,000 00	25,000 00
Dairy Association of the Province of Quebec.. . . .	2,000 00	2,000 00
Dairy School of the Province of Quebec, St. Hyacinthe, and official Laboratory.. . . .	25,000 00	25,000 00
Dairy Industry and inspection of factories for the manufacture of dairy products.. . . .	140,000 00	130,000 00
Horticulture.. . . .	30,000 00	20,000 00
Journal of Agriculture.. . . .	27,000 00	27,000 00
Aviculture.. . . .	15,000 00	15,000 00
Apiculture.. . . .	20,000 00	6,000 00
Exhibitions.. . . .	32,000 00	32,000 00
Civil Government—Salaries.. . . .	55,533 00	52,166 00
Total.. . . .	\$1,091,033 00	\$984,166 00

FIELD CROP COMPETITIONS, 1921
ONTARIO

OVER two hundred Agricultural Societies entered the Field Crop Competitions during 1921, but, owing to the abnormal season, the competitors in many of them had to cancel their entries and the actual number of Societies to which judges were sent was one hundred and seventy-three.

During 1921 there was inaugurated, in conjunction with the Dominion Seed Branch, a Combined Standing Field Crop and Threshed Grain Competition, with a view to increasing the supply of pure seed grain in the Province which would be available for registration.

The returns of all the societies that entered the Combined Standing Field Crop and Threshed Grain Competitions are not yet complete, as the analysis of the samples of some of the grain in the bins has not been finished, but it is satisfactory to know that in spite of unpropitious weather last season which prevented the heads of grain filling out as usual, there will, nevertheless be several

thousand bushels of good seed grain available for sowing in 1922.

Thirty-one societies entered the Combined Competition in oats, one in spring wheat, two in corn and three in potatoes, which is quite satisfactory for the first year. The Federal Minister of Agriculture has approved of the continuation of this Combined Competition in 1922, and if the season is a normal one, as more societies have signified their intention of entering, there will be sufficient pedigreed seed grain and certified potatoes to meet the requirements of this Province to a large extent.

Upwards of 1,000 farmers made a creditable showing in this co-operative work and stimulated the co-operative idea. A number of the societies have gone further and undertaken the establishment of seed-producing centres which was one of the objects aimed at.

The regular Standing Field Crop Competitions are being continued this year and judging from the entries already received more farmers will enter than ever before.

SASKATCHEWAN

Very exceptional interest was displayed in 1921 in Saskatchewan in field crop competitions. This was probably due partly to the fact that there was promise early in the year of particularly good crops, and partly to the new regulation requiring that a field crop competition be held before a seed fair grant could be earned. Following are some details concerning the competitions held:—

Competition	No. Societies Holding Same	Total No. of Competitors
Fields Wheat.	31	397
Fields Oats.	27	168
Fields Barley.	10	31
Fields Flax.	3	15
Fields Rye.	5	18
Fields Potatoes.	9	60
Combined Seed Crop and Cleaned Seed Competition (all wheat)	4	55
Forage Crop	14	47

As an indication of the quality of the fields entered, it is interesting to note that 123 out of a total of 452 wheat fields entered (including the combined competition) received a field score of 90 or over. Special mention might be made of the wheat competition held by the Carleton District Agricultural Society in which 19 out of 32 fields received scores of 90 or over; of the competition at Richard with 10 out of 15; and at Prince Albert with 10 out of 11 scoring 90 points or over.

The forage crop competition is one recently added to our list which is supported by a provincial grant equal to 50 per cent of prizes paid to a maximum of \$75. The need for more knowledge regarding forage crops has become clearly apparent during recent years, and this competition was particularly

THE AGRICULTURAL GAZETTE OF CANADA

designed to encourage self-help among the farmers in meeting this need.

As will be noted, four societies, namely, Wawota, Prince Albert, Indian Head, and Strasbourg took up the new Combined Seed Crop and Cleaned Seed Competition in 1921, enrolling 14, 11, 14 and 16 competitors respectively. Only the first two carried the competition to completion. The other two competitions were cancelled owing to adverse harvest conditions. The grain was scored in the field by members of the field staff of the Provincial Field Crops Branch acting for the Extension department and the bin scoring was carried out under the direction of J. E. Blakeman, Western Representative of the Dominion Seed Branch.

The Provincial Committee, which determines what seed shall be used for these competitions, met on March 18, 1922, and decided that for this year only registered seed shall be used. This will probably result in fewer competitions being held than was anticipated, but it will mean that, where such competitions are held, there will be made available a large supply of reliable seed.

The only stipulation regarding seed used by competitors in 1921 was as follows: "The seed used by competitors should be registered or of such excellent quality in respect to freedom from weed seeds and trueness to type that in the opinion of the judge, when examining the field, it is good enough for competition."

ALBERTA

The standing Field Crop competitions and the Good Farms competitions in Alberta for 1921 did not bring out as many competitors as in former years. On account of climatic conditions there were poor crops in some sections of the province where field competitions, under normal conditions, are usually keen. Two competitions were held, one at Sedgewick and one at Lacombe, and were very satisfactory, both to the Agricultural Societies conducting the competitions, and to the Department of Agriculture.

The Sedgewick competition showed 24 fields of wheat, and 10 fields of oats entered for the Field Crops, and ten farms entered for the Good Farms. The quality of most of the fields entered was very good, the highest score being 95 out of a possible 100. A number of others scored over 90, and all were over 80. The winning score in the Good Farms competition was 87.

The Lacombe competition had 14 fields of wheat, 16 fields of oats, and 11 fields of barley entered, and the winning scores were equally as good as those in the Sedgewick competition.

THE GIRLS' INSTITUTES OF ONTARIO

BY EMILY J. GUEST, M.A., TORONTO

THE Junior Women's, or as they are popularly known, the Girls' Institutes, continue to be one of the interesting features of the Ontario institute organization.

Where their numbers are small, the girls usually carry on as an integral part of the Women's Branch Institute, receiving special consideration when the programme is being planned and car-

ried out. As a rule also, one girl is elected to the Branch board of directors to represent the junior members and bring forward their views and desires. Sometimes also they form a girls' circle within the branch, having their own chairman who is a member of the executive, and making themselves responsible for all of some meetings or some of each. These methods remain popular

in many places where much driving is done as mother and daughter can thus come together to the meetings. Also the life and brightness brought into the meetings by the girls is greatly appreciated by the women.

Where there are a considerable number of girls brought together by such interests as one of the short courses, they frequently decide to organize a junior institute, still co-operating closely with the women's institute, if there is one, but planning and carrying on their own work and meetings and receiving similar help and recognition from the department in the way of grants, literature, and extension lectures. In their own programmes, besides the regular study of better and more scientific home-making—for as the majority of the girls are looking forward to having a home of their own, one of the primary aims of the club is to prepare them better to fulfill this mission—community matters, schools, hospitals, libraries, and recreation are given attention.

For the hospitals the branch undertakes plain sewing of such a kind that the younger girls can share in it. In some cases at least one complete infants' layette, cradle included, is made during the year.

The junior institutes are showing, too, an active friendly interest in the schools, visiting them and the teacher, giving prizes at the school fairs, encouraging the literary societies, and doing what they can generally to aid in getting better, cleaner and more attractive schools and grounds.

Besides an active sympathy with the improvement of the local libraries, the juniors avail themselves of the travelling girls' libraries sent out on loan by the Library Branch, Department of Education. The books are selected to meet the needs especially of girls and can be had for a period of six months in the institute by the branch paying one-way express charges. The travelling library is returned and, if desired, replaced by a fresh one.

Play has, of course, its legitimate place. Co-operation with the seniors has resulted in the provision for tennis, basket or volley ball, and other wholesome recreations in connection in some cases with the community hall grounds. At the indoor gatherings, essays, debates, one minute speeches, story telling, discussions, spelling and geography matches, music, contests, and folk games are features.

The branches plan their meetings—usually two hours in duration—to suit their own tastes and needs. The first hour is given to serious work—papers, debates, discussions, handicraft, domestic science, or the study of Shakespeare or some other author, and the second to recreation—chorus singing, instrumental music, physical culture, folk games, table games, and charades or tableaux in some branches.

Others devote an entire meeting to each of the following subjects in rotation:—

- (1) Horticulture, Agriculture, and out-of-door matters;
- (2) Literary and education topics;
- (3) Practical and ideal home-making;
- (4) Social.

It is expected that all social gatherings of junior institutes be properly chaperoned and close at a reasonably early hour.

Short courses by departmental demonstrators and lecturers remain popular. These are often carried on at the same time as the junior farmers' courses in agriculture, the two organizations uniting for a weekly literary afternoon and concluding with a joint banquet at which there are toasts, music, recitations, and speeches by prominent people.

One county followed up such a course in domestic science by selecting a team of four, a captain and three others, from each junior branch in the county, to put on a canning contest at the fall fair. The prizes were trips to institute conventions in one or other of Ontario's

THE AGRICULTURAL GAZETTE OF CANADA

leading cities, or canning outfits for the home. One such short course, recently closed, lasted for a month and brought together over two hundred and fifty young people from the countryside, being a veritable little travelling college, in a small centre remote from the large cities.

Some features of interest from the girls' programmes are:

Education: Studies in parliamentary law and procedure; How we are governed; Laws of health and beauty; English and Canadian literature; Public speaking.

Home Craft: Planning, remodelling, and furnishing a house; Understanding and caring for the human body; Good form in home and in public.

Income Earning Pointers for girls on the farm, in the home, in the community.

Healthful Recreation, out of doors; indoors.

Junior women's institutes may avail themselves of departmental assistance through the various short courses in domestic science, sewing, millinery, first aid and home nursing, and house decoration; also of help from individual lecturers on special topics in connection with the Institutes Branch of the Department of Agriculture; the travelling libraries, extension lectures, and assistance in the preparation of papers through the Packet Loan Library of the Ontario Agricultural College at Guelph.

PART III

Agricultural Education and Related Activities

SCHOOL FAIRS AND HOME GARDEN CONTESTS — ONTARIO — 1922

BY R. S. DUNCAN, B.S.A., DIRECTOR, AGRICULTURAL REPRESENTATIVE BRANCH

SCHOOL FAIRS have had a wonderful development in Ontario during the past few years. Their popularity does not seem to be waning in the least and it is a particularly encouraging sign to see the deep interest

that is developing from year to year amongst the local people.

The growth of the movement can best be gleaned from the following figures given in approximately seven-year periods:—

	1909	1915	1921
Number of School Fairs held.. . . .	1	234	449
Number of schools included.. . . .	3	2,291	3,847
Number of children taking part.. . . .	58	48,386	95,307
Number of home plots.. . . .	58	51,243	114,216
Number of entries made at the fairs.. . . .	174	116,236	193,545
Number of children attending fairs.. . . .	80	72,860	154,831
Number of adults attending fairs.. . . .	170	84,406	188,728
Total attendance at fairs.. . . .	250	157,266	343,259

This is truly a phenomenal growth, and it is the desire of the department to extend from time to time this form of education to all the rural schools in the province in order that all school children may enjoy its benefits.

During the past season, the Ontario Department of Agriculture, through the Agricultural Representatives, distributed to the boys and girls enrolled in the School Fair movement the following quantities of seeds and eggs:—

Potatoes.. . . .	1,039 bags
Oats, barley and wheat.. . . .	252 bushels
Peas and corn (sweet and field).. . . .	24,100 packages
Beets, carrots, onions and parsnips	42,000 "
Mangels and turnips	12,800 "
Asters, phlox, sweet peas and cosmos.. . . .	30,750 "
Eggs, bred-to-lay Barred Plymouth Rock.. . . .	10,852

Each School Fair is carried on by a board of directors composed of representatives from the school, the Agricultural Representative acting as manager. In most cases the Representative is assisted by a local committee represent-

ing the teachers, trustees and parents, and where we have an active committee all pulling together, there is no weak link in the chain.

One of the greatest handicaps to better work is the annual change of teachers, but this is gradually being overcome because many teachers have had more or less experience with school fairs even before they graduate from the Normal schools.

It is very gratifying to report that the quality of the exhibits is improving from year to year. The pupils are gradually learning that it does not pay to bring anything but "good stuff" to the fair. The judges are requested to point out by comparison the difference between the exhibits awarded first prize and those awarded second, third, fourth, fifth and sixth prizes. Besides giving reasons for their placings, the judges try to point out to the exhibitors and others the desirable type, what constitutes quality in the various classes called for on the prize list, and to offer hints or

suggestions as to the preparation of exhibits. To my mind this is one of the greatest educational features of the school fair.

District championship School Fairs were held during the past season in the following counties: Frontenac, Halton, Norfolk, Oxford, Welland, and Wentworth, and Rainy River and Manitoulin districts. The first, second and third-prize exhibits from the various school fairs in the county or district were eligible for competition, the agricultural society supplying practically all the prize money.

Championship fairs are feasible only where it is possible to conduct the school fairs sufficiently early in the season to allow prize exhibits to compete at the place where the championship fair is held and where transportation facilities are sufficient. Boys and girls take a great pride in winning a championship ribbon, and the quality of the exhibits is reflected in the local school fair. The championship goal seems to be an added stimulus. The exhibits staged at these championship fairs were not only a credit to the pupils but also to the district from which they came. The pupils are "broadening out," and they are gaining a wonderful experience which will have its effect upon the larger fairs in the future.

During the past two or three years, there has been an agitation on the part of the officers of some agricultural societies to have the school fairs linked up with fairs held under society auspices. Those favouring the holding of joint fairs put forth the argument that there would be less duplication of work and effort and the combined fair would be more successful. This scheme has had a fair trial, and about the only thing to commend itself is the fact that the gate receipts are greatly increased. The greatest objection to holding joint fairs is the fact that in the great majority of cases there are too many counter-attractions and difficulty is found in carrying out the well-arranged programme

for the entertainment and especially the education of the children. With this plan, the school fair would more or less lose its identity and defeat some of the objects for which it was originally formed, namely to give inspiration and create greater interest, broadly speaking, in agriculture.

The department feels that school fairs should be held separately and distinct from county or township fairs. In some communities, however, the local people feel that the two can be combined quite nicely, and in order to guard against the objections raised, the department insisted that where the fall fairs held under the auspices of the agricultural societies and the school fairs are conducted jointly the following conditions must be complied with:—

1. *Prize List.*—That the list of classes for the Rural School Fair, prepared by the Agricultural Representative and the Rural School Fair Association, be included in the regular prize list of the Agricultural Society.

That one copy of this prize list be distributed to each pupil or one copy to each family or household in the Rural School Fair Association.

That the prize list be issued not later than June 1. Where it is impossible to issue the regular Agricultural Society Prize List by this date the Society should issue a separate School Fair prize list for early distribution.

2. *Finances.*—That the Agricultural Society supply half the prize money, such sum not to exceed \$75, for these classes and that the sum be paid in cash to the manager or secretary of the Rural School Fair Association prior to the fair.

3. *Accommodation.*—That the Agricultural Society supply suitable building or tent accommodation for displaying the pupils' exhibits, together with tables and poultry coops, and have same in readiness the day previous to the fair. Where this equipment is supplied by the Department of Agriculture, the Agri-

-cultural Society must pay transportation and cartage charges, and furnish help to erect the tents.

That suitable field accommodation, properly enclosed, be definitely assigned to the Rural School Fair for the purpose of holding sports, parades, judging of live stock.

That a programme for the day be decided upon by Agricultural Society officials and Agricultural Representative to avoid clashing of events.

4. *Admission.*—That all the pupils and teachers in the schools taking part in the Rural School Fair be given free admission to the fair.

5. *Judges.*—That the Agricultural Society supply judges for exhibits such as poultry, live stock, vegetables, grains, etc., satisfactory to the Department.

6. *Protection.* (Constables).—That the Agricultural Society supply protection for Rural School Fair exhibits.

New Features

A successful school fair must have something new and worth while each year. The pupils demand change in order to keep up interest. Sports are merely an added attraction. Last year many Representatives conducted some competition that was entirely new to the children, such as judging competitions for teams of three boys in live stock, and for three girls in sewing or darning; individual competitions in naming weeds, apples, vegetables, and live stock, the latter from pictures; chicken plucking, boys' riding, girls' hitching and driving, public speaking and singing competitions and Stratheona Drill and school fair parade. Not all of these contests can be carried out at any one fair but a few new "stunts" each year add interest and keep up the enthusiasm of the children.

The Home Garden Contests

The Home Garden contest is primarily intended for the teen-age boys and girls on the farm. Sufficient seed is given each contestant to plant a plot 30 x 40 feet according to the accompanying plan. An optional plan is given to allow for horse cultivation; the vegetables being planted in 10 rows, 30 inches apart and 75 feet in length. The crops grown are as follows:—tomatoes, corn, cabbage, peas, beans, onions, radish, lettuce, parsnips, beets, carrots, swiss chard, cucumbers, squash, citron, and spinach. A special pamphlet, showing the crop arrangement, plan of garden, and giving cultural instructions is handed each contestant. Each contest comprises 25 gardens. During the past season the competitors paid the cost price of the seeds, namely 75 cents, and in all there were 75 Home Garden contests, including 1,875 pupils.

During the months of July and August, the Agricultural Representatives inspected the gardens and awarded prizes for the best gardens. In addition, special prizes were offered at the school fair and local fall fair for exhibits of vegetables from the home garden. Last year competitors were required to can products from their gardens and exhibit these at the fairs along with the fresh vegetables. This year it is planned to make canning optional.

The object of these Home Gardens is to interest boys and girls in better agriculture and encourage the use of more vegetables in the farm home. It is truly surprising what can be grown in a small garden, and after allowing the family free use of the vegetables grown many of the boys managed to dispose of the surplus products and made a little 'pin money.' They were thus able to thoroughly enjoy spending a little money earned by the exercise of their own skill. These early lessons in finance should stand them in good stead.

THE O.A.C. STUDENTS' CO-OPERATIVE ASSOCIATION

BY H. C. MASON, B.S.A.

THE first co-operative undertaking of the students of the Ontario Agricultural College was the establishment and publishing of the "O.A.C. Review," thirty years or more ago. The success of this oldest agricultural college magazine has been such that it has encouraged other developments in co-operation. Early in 1913 the Students' Co-operative Association was organized and a little later incorporated. The first year's business amounted to a few hundreds of dollars; last year's turnover totalled about \$25,000, and it is still growing.

The association as at present constituted consists of three branches—the Supply Store, the Rink, and the Review. Each of these belongs to the student body and is managed by a committee of student-directors elected by the student body to that particular branch. Over all three is a central committee and a Managing Director, Mr. H. H. LeDrew. This organization gives scope to individual initiative in developing the various branches, and at the same time the central executive is there to co-ordinate the work of all three. If any one of the three branches fails to make a financial success for the year, it can be "carried" by one of the others.

The association is modelled upon the "Rochdale" pattern of co-operation. The distinctive features of this system are:—

- 1, Sales for cash only; 2, Sales for current retail prices to member and non-member alike; 3, The retention of part of the surplus or profit of the business for use in operation or expansion; 4, The distribution of the remainder of the surplus to members in proportion to their purchases, not to the amount of stock held. In the case of the Students' Association, the amount of "stock" held

by each member is equal, and consists merely of the subscription price for the Review for the year and a season ticket for the rink. Proportional method of distribution of profits is one of the strong but little-understood points of the Rochdale system. In practice it works out thus:—Member A purchases \$10 worth of goods through the Supply Store; Member B purchases \$50 worth. A dividend of, say, five per cent is declared at the end of the year. Member A receives 5 per cent of the value of his purchases, 50 cents; Member B receives 5 per cent of the value of his purchases, \$2.50. By this system the member whose business has been most valuable to the association receives the greatest return, which is undoubtedly as it should be.

The association has seen its dark days; the Rink twice collapsed under the heavy snow; real estate purchased for the erection of a large co-operative building has had to be carried all through the war period because of unsettled conditions; but the organization is still growing, and year by year is rendering more valuable service to the students of the O.A.C. and the agriculture of Canada as a whole. The O.A.C. Students' Supply Store now has a continent-wide reputation as clearing-house for agricultural text books. The outside "sales to non-members" last year reached \$12,000. Within the past few months a motor truck has been added to the equipment, and the association truck now does all hauling of trunks, luggage, etc., for students as well as handling the ever-growing business of the association itself.

Not the least important work of the association is the education it affords in journalism, business management, and co-operation.

PART IV

Special Contributions, Reports of Agricultural Organizations, Publications and Notes

“AVAILABILITY” IN PLANT FOODS

BY DR. A. MCGILL, DOMINION ANALYST, DEPARTMENT OF HEALTH

MODERN facilities for the distribution of farm products together with the great increase of town dwellers that has occurred during recent decades, has caused the consumption of vast amounts of these products far from the places of their production, and the consequent permanent removal from the local soil of the plant constituents that they represent. The importance of mixed farming, and the raising of cattle, as a means of maintaining farm-land in good condition cannot well be over-emphasized. But even so, the shipment of milk and eggs to our cities means a partial removal of plant food; and ultimately the stock itself finds, in large part, a city market; while modern systems of drainage assure the final destruction of this material, so far as its agricultural value is concerned, in the form of sewage.

A complete plant food implies the presence of many other elements than nitrogen, phosphorus and potassium, but it is nevertheless recognized that these three take first place in importance so far as impoverishment of soils is concerned. Hence the values of all artificial fertilizers are stated in terms of them. There is no soil naturally so rich in these elements that it may not be exhausted insofar as one or other of them is concerned; while in the case of most soils that have been farmed for a series of years, without systematic replacement of the nitrogen, phosphorous or potassium removed by the crop, the impoverishment becomes evident to the most careless observer.

The intelligent purchaser of a fertilizer naturally desires to know the total amount of each component present in what is offered to him. It is probably true that, no matter in what form or combination nitrogen, phosphorus or potassium may be present in the fertilizer, it will ultimately, through those atmospheric and other influences that we comprehend under the term weathering, become available to plant nutrition. The period may however be a long one, and the farmer is not prepared to do business with a salesman who can guarantee availability only after an interval of many years. The term “available nitrogen” carries with it no persuasion unless it is understood to mean that the element in question will show results during the season of its application to the soil.

There can be no doubt that the word “available” is emphatically the selling word for fertilizers, and it is very desirable that it should carry a definite and legally recognized signification. It may mean that the plant nutrition supplied will show results in the earliest stages of growth, or later on in the season; but it is at least quite clear that the buyer expects to see results sometime during the season in which it is applied. The farmer who pays actual money for a fertilizer expects to see actual results in its use during the same year. I would suggest that the following definition of the term available, as applied to fertilizers be locally adopted:—

Available, means that quantum of the fertilizer content, which under

normal conditions of soil, weather and cultivation, will show results during the season in which it is used.

The problem of compounding a special fertilizer so that available nitrogen, phosphorus or potassium shall declare its effect upon the crop in the early part of the season, or during the whole course of the season, is one to be solved by the skill and knowledge of the manufacturer; and undoubtedly the manufacturer who succeeds best in meeting conditions desired by his customers will be rewarded by securing the largest market.

There remains the very serious question of ascertaining how, and to what extent, the nature of the numerous raw materials that may enter into the make-up of a fertilizer, lend themselves to definite statements of the availability (in the above sense) of their various content of nitrogen, phosphorus and potassium.

Since the elements named are taken up by the roots of the plant, and must be dissolved by water for that purpose, it seems pretty certain that, whatever proportions of total nitrogen, phosphorus and potassium are taken into solution by water applied directly to the fertilizer under conditions comparable to those of normal agriculture, may with reasonable certainty be accepted as available. In this sense the whole of the nitrogen entering into the composition of the fertilizer as nitrates or as ammonium salts or as cyanamide, must be regarded as available. So the phosphorus introduced as free phosphoric acid, or as soluble salts of phosphoric acid, will be available; and as practically all salts of potassium are soluble in water, this element introduced as the chloride or sulphate will be entirely available. Up to this point, we find little difficulty in furnishing the fertilizer manufacturer with rules to guide him in stating available nitrogen, phosphorus and potassium in a product whose composition is known to him.

But the named elements are in practice, introduced into most fertilizers in forms which, although not immediately water-soluble, become so through the action described above as weathering, or through the prolonged action of those slightly acid exudations characteristic of the root hairs of the plants themselves. Thus it has long been recognized that phosphorus introduced into the fertilizer as Di-calcic phosphate, although not immediately water soluble, becomes largely available during the season of growth, through imperfectly understood changes, more or less similar to those attributed to weathering. It has been held that a fairly accurate measure of the phosphorus so rendered available is found in the employment, in a definite manner, of neutral citrate of ammonium. Basic slags are known to contain more or less phosphorus in combinations that are insoluble in water, but which yield their phosphorus to plants under normal soil conditions during the season. Professor Wagner believed that a trustworthy way of measuring such available phosphorus consisted in the application of two per cent citric acid to the slag. The accuracy of this mode of measurement of such phosphorus has been called in question, and without any doubt, the method requires further study.

Doubtless more or less of the nitrogen, phosphorus and potassium existent in animal offal, tankage, blood, raw bone, proteid matters, gristle, peat, wood ashes, and the hundred and one materials that go into the manufacture of commercial fertilizers can be measured with satisfactory accuracy by the adoption of methods of work upon the material itself, although such methods are not yet described in our text books.

Just here lies a wide field of investigation requiring the intelligent and sympathetic co-operation of agriculturist and chemist; because the method finally adopted by the chemist must depend for its value and significance upon laboratory work done in parallel with

THE AGRICULTURAL GAZETTE OF CANADA

field experiment. In no other way can the trustworthiness of the chemist's modus be established. And until assured methods are finally worked out, no fertilizer should be permitted to claim, as available, more of its content of nitrogen, phosphorus or potassium than our present knowledge permits us to describe with certainty as available, in the sense above suggested for that term. Only by observing this principle can a feeling of confidence in use of fertilizers be developed; and my experi-

ence goes to show that there is great need of developing such conviction in the minds of Canadian farmers, if manufactured fertilizers are to hold the place that they should do in agriculture. Disappointment, through the failure of hopes based upon misrepresentation is not only the infliction of a serious and irremediable wrong done to the farmer, but prejudices his mind against that which, intelligently employed, may be the only thing that stands between success and failure in farming.

CANADA'S BIRDS

BY HARRISON F. LEWIS, CHIEF FEDERAL MIGRATORY BIRD OFFICER FOR ONTARIO AND QUEBEC

EACH of the various forms of animal and plant life in the world is endeavouring, consciously or unconsciously, not only to perpetuate its kind but to increase the existing number of individuals of its species. As a result, each form struggles with other forms, with which it comes into contact, for food, space, and other essentials of life. This struggle tends to fill all available positions in which life can exist, and to limit the increase of the various forms. The quasi-equilibrium now resulting from this opposition between the life-forms is termed the balance of nature. It is an unstable condition, in which movements, usually fluctuating, take place ceaselessly, but in general rather slowly.

Man, as one of the forms of life on the earth, is obliged to participate in the inter-specific conflict. At present our species enjoys advantage, because of the superior intelligence and the nimble and adaptable physical structure which it has developed. In the pressing of this advantage and the consequent continued shifting of balance in favour of our species, use is constantly made of assistance derived from the development or direction of the activities of other forms of life

with which we are in contact. Among the forms which are thus useful to humanity the birds occupy a prominent place.

The relation of birds to agriculture through their feeding upon insect forms which destroy cultivated plants and injure domestic animals is of great importance. In Canada, where agriculture is the occupation of a very large part of the population, the assistance received from the birds by humanity through this relation is comparatively direct, yet it is but poorly realized. Mr. Arthur Gibson, Dominion Entomologist, has recently estimated that the annual loss in Canada to field, orchard, and garden crops, due to destructive insects, is more than \$200,000,000. The consumption of insects by birds prevents this loss from being far greater. The fact that birds are very mobile forms enables them to congregate much more readily than can most organisms at points where food is most plentiful, that is (in the case of insectivorous birds), where insects most abound. Thus they perform exceptional service in preventing unduly rapid and unfavourable disturbances of the balance of nature by insects. Although they eat numbers of para-

sitic insects, and thus appear at times to exert pressure unfavourable to man, it is probable that even their destruction of parasitic insects, viewed as a part of their total activities, generally assists in maintaining such a beneficial balance as is most favourable for the expansion of our kind.

Some birds eat habitually such forms as field mice and other rodents, which are injurious to that part of man's food supply obtained from agriculture. Some eat and in part destroy the seeds of plants inimical to man's present interests. These birds bear, through their influence on agriculture, a relation to man essentially similar to that of the insectivorous birds, and their value to us is of the same kind, and proportionate to the nature and extent of their beneficial activities.

The most important relations of many arboreal insectivorous birds to humanity are through their influence, not on agriculture, but on forestry. Forests provide many things now necessary to the unchecked development of our species. These forests are always being attacked by insects, which would soon destroy them, to our great injury, were their natural expansive efforts successful. This consumption by birds is a very important part of the pressure which holds them in place. Here also the natural avian forces are being applied parallel to our own.

Still other wild birds, known as game birds, are of importance to humanity because of the food which they furnish directly, in their bodies, to mankind, and because the sport of hunting them is an attraction sufficient to lure great numbers of men to take physical exercise in the open air, which prolongs their lives and makes them more efficient. The value, expressed in dollars, of the human food obtained annually from game birds, is undoubtedly seldom realized. Reports received by the Department of Agriculture and Immigration of the province of Manitoba show 183,808 game

birds killed in that province in 1920, including 139,216 wild ducks, 36,828 prairie chickens, 5,682 partridge (Ruffed Grouse), and 478 geese. Probably nearly an equal number of birds were killed but not reported, but if the total given be accepted, and the very low average value of fifty cents apiece be allowed for the birds, it appears that the game birds killed in Manitoba alone in 1920 were worth \$91,904. Similar figures are, unfortunately, not available for the entire Dominion of Canada, but the game birds actually taken in the Dominion each year must be worth, as food, at least \$1,000,000.

Birds also assist the development and expansion of the human species by restricting the spread of disease. This they do by acting as scavengers, as in the case of vultures and gulls, and by destroying disease-bearing insects, as is done by swallows, flycatchers, sandpipers, and others.

Some sea-bird colonies aid mankind by heaping up guano which is utilized to increase the agricultural production of food, and others are of use because by their cries they warn seafarers in foggy or stormy weather of the location of the rocks or sand-bars on which they live.

Because birds supply food for the nourishment of humanity and, by many of their activities, decrease resistance to the continuance and expansion of the human species, as well as because they appeal to the aesthetic and sentimental part of man's nature, it is in the interest of mankind that they shall be perpetuated in reasonable numbers. This now involves legal protection for many birds, because otherwise they would be seriously reduced in numbers or wholly destroyed for present profit, owing to the cupidity of many unsocial or ignorant human individuals.

In Canada the birds receive protection both from the provincial Governments and from the Dominion Govern-

ment. In the case of the Dominion Government this protection is given under authority of the Migratory Birds Convention Act and the regulations made thereunder. This Act is based upon a Convention between His Britannic Majesty and the United States of America, which was signed at Washington in 1916. The Act authorizes protection of various species of birds of which a greater or less number of individuals habitually migrate twice a year across the border between Canada and the United States. The protected birds are divided into three groups, viz., migratory insectivorous birds, migratory game birds, and migratory non-game birds. The insectivorous and non-game groups are afforded pro-

tection throughout the year. Certain of the game birds have been given a closed season for a period of years, but for most of the game birds there is a period, not exceeding three and a half months a year, in the autumn or winter, in which hunting is allowed, under certain restrictions.

As a result of the protection afforded by this Convention, the administration of the provisions of which is, in Canada, in the hands of the Commissioner of Dominion Parks, the protected species of birds have, in general, increased in numbers, and the satisfactory continuation of a plentiful supply of Canada's birds is, under present conditions, assured.

AMENDMENTS TO THE REGULATIONS UNDER THE DESTRUCTIVE INSECT AND PEST ACT

BY L. S. McLAIN, CHIEF DIVISION OF FOREIGN PESTS SUPPRESSION, ENTOMOLOGICAL BRANCH

ON February 10, 1922, the European Corn Borer quarantine placed on certain areas of the province of Ontario and known as Quarantine No. 2 (domestic), was revised and brought up to date. This revision quarantines the townships found infested by the European Corn Borer during the years 1920 and 1921. At the present time one hundred and six townships are covered by the quarantine which comprises an area of 8,214 square miles.

The quarantine reads as follows:—

"The fact has been determined by the Minister of Agriculture and notice is hereby given that an injurious insect, the European Corn Borer (*Pyrausta nubilalis* Hubner) new and not heretofore widely prevalent or distributed within and throughout the Dominion of Canada, exists in the province of Ontario, and that there is danger of this insect being spread into other districts by reason of the movement of corn plants or portions of plants infested with the pest.

"Therefore, His Excellency the Governor General in Council is pleased.—

"1. To order that the areas comprised in the following counties and townships be and they are hereby quarantined:—Brant county; Elgin county; the townships of Gosfield South, Mersea and Pelee in Essex county; Haldimand county; the townships of Goderich, Hay, Stanley, Stephen, Tuckersmith and Usborne in Huron county; the townships of Camden (including the Gore of Camden), Harwich, Howard, Orford, Raleigh, Romney, Tilbury east and Zone in Kent county; the townships of Brooke, Euphemia and Warwick in Lambton county; the townships of Clinton, Gainsborough, Grantham, Louth and Niagara in Lincoln county; Middlesex county; Norfolk county; the township of Pickering in Ontario county; Oxford county; the townships of Blanchard, Downie, Easthope North, Easthope South, Ellice, Full-

THE AGRICULTURAL GAZETTE OF CANADA

arton, Hibbert, Logan and Mornington in Perth county; Waterloo county; Welland county; the township of Guelph in Wellington county and the township of Ancaster in Wentworth county; all the aforementioned areas being in the Province of Ontario;

"2. To prohibit the removal of Corn Fodder or Corn Stalks including Broom Corn whether used for packing or other purposes, Green Sweet Corn, Roasting Ears, Corn On The Cob, or Corn Cobs, from the said quarantined areas to points outside those areas;

"3. To prohibit further the removal of the products mentioned under section two from the counties of Elgin and Middlesex to other points in the quarantined areas.

"This quarantine shall not apply under the following conditions:—

"1. To the articles enumerated when they shall have been manufactured or processed in such a manner as to eliminate all risk of carriage of the European Corn Borer.

"2. To clean shelled corn and cleaned seed of broom corn.

"3. To shipments of the articles enumerated transported through the quarantined areas on a through bill of lading.

"4. To shipments of the articles enumerated for experimental or scientific purposes by the Dominion Department of Agriculture or the Ontario Department of Agriculture.

"5. To shipments of dried seed corn on the cob for exhibition purposes and consigned to the Secretary of a winter fair or exhibition duly recognized by the Dominion Department of Agriculture or the Ontario Department of Agriculture. Such shipments shall be inspected at point of destination by an inspector duly appointed under the Destructive Insect and Pest Act.

"Any person who contravenes this quarantine will be prosecuted as provided for in the Destructive Insect and Pest Act.

"This order shall take effect forthwith and be in force until further notice."

It will be noted from the above that a double quarantine has been placed on the counties of Middlesex and Elgin, as these are the most heavily infested districts in the quarantined area. This will prevent the shipping of the products mentioned, and which are likely to be severely infested with the European Corn Borer, to the more lightly infested districts, and it is hoped in this way to retard the development of heavy infestations in the outlying sections of the quarantined area.

On March 21, 1922, four Orders in Council were passed dealing with the general regulations, and amending certain subsections of section 7, which prohibits the importation into Canada of certain plant products likely to be affected with serious insect pests or plant diseases. The Amendments together with Section 7 are as follows:—

"Section 7. The importation into Canada of the following is prohibited:—

"(a) Potatoes from Europe, Newfoundland, the islands of St. Pierre and Miquelon, and the states of California, Pennsylvania and West Virginia.

"All shipments of potatoes from the United States of America shall be accompanied by a certificate duly signed by the consignor stating the name of the state in which the potatoes were grown.

"(f) All species and varieties of currants and gooseberries (*Ribes* and *Grossularia*) but not including the fruits of these, from all foreign countries.

"Provided, however, that the importation of said vegetation shall be permitted without any restriction into the province of Ontario from the state of New York.

"(h) Corn and broom corn (including all parts of the plant), all sorghums, sudan grass, cut flowers or

entire plants of chrysanthemums, aster, cosmos, zinnia, hollyhock, and cut flowers or entire plants of gladiolus and dahlia except the bulbs thereof without stems, oat and rye straw as such or when used for packing, celery, green beans in the pod, beets with tops, spinach and rhubarb, from the following counties in six of the United States of America:—

“Massachusetts: Barnstable, Bristol, Essex, Middlesex, Norfolk, Plymouth and Suffolk;

“Michigan: Monroe;

“New Hampshire: Rockingham;

“New York: (Eastern) Albany, Fulton, Hamilton, Montgomery, Rensselaer, Saratoga, Schenectady, Schoharie, Washington and Warren;

“New York: (Western) Cattaraugus, Chautauqua, Erie and Niagara;

“Ohio: Ashtabula, Cuyahoga, Erie, Lake, Lorain, Lucas and Ottawa;

“Pennsylvania: Erie;

unless the same are accompanied by a certificate of inspection issued by an authorized officer of the United States Department of Agriculture, which states that the shipment is free from infestation by the European Corn Borer.

“This prohibition does not apply to the plants enumerated when they shall have been manufactured or processed in such a manner to eliminate all risk of carriage of the European Corn Borer, nor to cleaned shelled corn nor to cleaned seed of broom corn.

“(i) Alfalfa (lucerne) hay, whether for feeding, packing or other purposes, originating in the areas hereinafter described: the counties of Delta, Dennison, Gunnison and Montrose in the state of Colorado; the state of Idaho; the counties of Ormsby, Storey, Washoe and White Pine in the state of Nevada; the counties of Baker and Malheur in the state of

Oregon; the state of Utah; and the counties of Lincoln, Sweetwater and Uintah in the state of Wyoming.

“Provided, however, that this prohibition shall not extend to shipments of alfalfa (lucerne) hay transported through the areas described above on a through bill of lading.

“Provided, further, that all shipments of alfalfa (lucerne) hay consigned to the provinces of Manitoba, Saskatchewan, Alberta and British Columbia, shall be accompanied by a certificate, duly signed by the consignor, which shall state the county and state in which the alfalfa (lucerne) hay was grown.”

Sections (a) and (f) will be administered by the division of Botany in co-operation with the Division of Foreign Pests suppression.

Section (a) dealing with the importation of potatoes was passed as a protective measure. Canada is free from the Potato Canker, and every precaution must be taken to keep it free. This disease has been found in Pennsylvania and West Virginia and these two states were added to the areas mentioned in the previous regulation.

Section (f) dealing with the importation of currants and gooseberries is also a protective measure. With the discovery of the White Pine Blister Rust on the Pacific Coast area of the United States, it was found necessary to close the Canadian border to all importations of vegetation carrying this disease. The importation of all species of pines susceptible to this disease has been prohibited for some years.

Section (h) restricts the importation of certain plants, cut flowers, vegetables, etc., from those areas in the United States infested by the European Corn Borer. This amendment brings the quarantine up to date and places an embargo on the localities found infested by this insect in 1921.

THE AGRICULTURAL GAZETTE OF CANADA

Section (l) dealing with the importation of alfalfa hay from areas infested by the Alfalfa Weevil, brings this embargo up to date and prohibits the importation of alfalfa hay from all the areas in the United States known to be

infested by this pest. The Alfalfa Weevil is a very serious pest of alfalfa and all precautions must be taken to prevent its introduction into the alfalfa growing districts in Canada.

AMENDMENT TO THE APPLE SUCKER QUARANTINE IN NOVA SCOTIA

The apple sucker was first discovered in the vicinity of Wolfville, Nova Scotia, during the summer of 1919. To prevent the spread of the insect into new territory on shipments of infested nursery stock, it was necessary to place a quarantine on the affected district in the fall of the same year. During the summers of 1920 and 1921, scouting work was carried on in co-operation with the

Nova Scotia Department of Agriculture to determine the spread of the insect.

This past summer it was found that the insect had spread into the county of Halifax, and on November 15, 1921, a ministerial order was passed, prohibiting the removal of nursery stock unless the same was accompanied by a certificate of inspection or a permit.

The order reads as follows:—

AMENDMENT No. 2 TO QUARANTINE No. 1 (DOMESTIC)

Ministerial Order Quarantining certain Areas on account of the Apple Sucker

"The fact has been determined by the Minister of Agriculture from reports submitted by inspectors of the Entomological Branch, that an injurious insect, the apple sucker, (*Psyllia mali* Schmidt) has been found in the county of Halifax, province of Nova Scotia.

"Now, therefore, I, Joseph Hiram Grisdale, the Deputy of the Minister of Agriculture for the Dominion of Canada, under authority conferred upon me by Section 7 of the Destructive Insect and Pest Act, 9-10 Edward VII, Chap. 31, do hereby quarantine the county of Halifax, Province of Nova Scotia, on account of the

apple sucker, and until further notice the regulations effective under Quarantine No. 1 (domestic) passed on August 21st 1920, shall apply in all respects to the said county.

"This amendment shall take effect immediately and be in force until further notice.

"Witness my hand this date and the seal of the Department of Agriculture, Canada.

"(Seal)

"(Sgd.) J. H. GRISDALE,
Deputy Minister of Agriculture.
"Date: Nov. 15, 1921.

IMPORT REGULATIONS FOR WOOL, HAIR, HIDES, ETC.

The attention of importers of foreign Hides and Skins, Wool and Hair is directed to the new regulations issued in that behalf by Order in Council and in virtue of "The Animal Contagious Diseases Act." These regulations super-

sede all previous ones in regard to these products. They become effective on May 1. Copies may be obtained from the Veterinary Director General, Health of Animals Branch, Department of Agriculture, Ottawa.

NEWS ITEMS AND NOTES

Mr. H. T. Güssow who, previous to the war was officially known as Dominion Botanist, will in future be recognized by that title. Acting on the report of the Civil Service Commission to the effect that the provisions of the Civil Service Act relating to suspensions were never given effect by Order in Council, the Minister of Justice has ruled that Mr. Güssow retains his official designation.

Dr. J. H. Grisdale, Deputy Minister of Agriculture and Mr. H. S. Arkell, Live Stock Commissioner, represented the Dominion Department of Agriculture at the conference held at Saskatoon, Sask., in March last to discuss plans for the further development of the Canadian Live Stock industry and co-ordination of policy.

Arrangements have recently been made by the Dominion Minister of Agriculture whereby practising veterinarians will be enabled to take part in the accredited herd work now being carried on by the Health of Animals Branch of that Department. By thus augmenting its regular staff, the Department hopes to proceed more rapidly with the testing of herds for tuberculosis than has been possible hitherto, and thus keep pace with the increasing demand. Veterinarians who desire to take part in this work will be enrolled on the approved list after passing the examination prescribed by the Civil Service Commission, and becoming familiar with the technique under the supervision of a regular inspector. Those who have already passed the examination will be eligible on taking the prescribed training. Veterinarians on the approved list will not only be available for herd testing, but also for emergency work, as well as for permanent appointment when vacancies occur, provided they are under the age of 41 years.

While the difficulties to be overcome and the objections to be met were not overlooked at the Ottawa dairy conference, the consensus of opinion was that the proposed grading and standardization of butter and cheese would be a move in the right direction, and would have a beneficial effect in stabilizing the trade with Great Britain and other countries. Emphasis was laid upon the advance in quantity and quality of the dairy products exported by New Zealand, Denmark, and other lands, and it was agreed that if Canada is to meet the increased competition that has arisen, she must take

this forward step. The Department is now organizing a qualified staff of graders. When that is done, the regulations adopted under the Dairy Produce Act will come into force.

As the Dairy and Cold Storage Commissioner of the Dominion Department of Agriculture states, the development of the dairying industry in New Zealand during the last twenty years is of great significance to Canada. In 1904 that country exported 35,203,728 lbs. of butter and 9,691,920 lbs. of cheese. Seventeen years later it exported 72,894,752 lbs. of butter and 151,588,304 lbs. of cheese. This enormous increase of over a hundred per cent in one instance and fifteen hundred per cent in the other is attributable to management, industry, and climatic and pastoral conditions, and to the fact, in the case of cheese, that their product is better seasoned on landing than our own. The last fact the Commissioner is inclined to attribute in a measure to the greater distance the cheese has to be carried, and to the care that is taken in temperature during transportation.

"We should never forget that our great market is at our own doors," comments J. A. Ruddick, Dairy Commissioner, in summarizing the dairy outlook in this country. "We export only about one-fifth of our total production. The annual consumption of milk and its products in Canada is equal to about 1,000 pounds of milk annually per capita. If our population should grow at the rate of 100,000 per year there will be required annually an additional 100,000,000 pounds of milk to supply them. Newer knowledge of nutrition is increasing milk consumption here, as it is everywhere."

According to the Dominion Live Stock Commissioner, Canada's exports of bacon to Great Britain declined from 1,493,000 long hundredweight in 1920 to 844,000 in 1921. Danish exports during the same period increased from 745,000 to 1,849,000 long hundredweight.

In an attempt to induce farmers to grow the type of hog required to make first quality bacon, which alone will enable the Canadian packer to meet competition, the Dominion Department of Agriculture will institute a system of grading hogs so that those of the right breeding, weight, quality, and finish, may command a premium. On their part the packers have agreed to pay a discrim-

THE AGRICULTURAL GAZETTE OF CANADA

inating price, and thus encourage production of the types desired.

The recommendations made for the protection of crops of all kinds from the ravages of injurious insects and plant diseases is worth many hundreds of thousands of dollars every year to Canada, according to the Dominion Entomologist. This advice is based on the work of scientific investigators and a rough estimate of the actual saving resulting from its adoption in 1919 and 1920 is as follows: Grasshopper control, 1919 and 1920, \$20,000,000; forest insects in British Columbia yellow pine, \$6,000,000; apple crop, by use of new copper arsenic dust, \$20,000 in 1920; by substitution of arsenate of lime for arsenate of lead, \$16,200 in 1920; by adoption of Thomson bordeaux mixture and dusting in place of lime-sulphur spray in Nova Scotia apple orchards, \$400,000; control of cabbage root maggot by the use of corrosive sublimate in Ontario, \$50,000 in 1920; control of Rose midge by use of tobacco dust, in Ontario, \$50,000 in 1920.

Returns have been compiled by the Poultry Division of the Dominion Live Stock Branch, as to the amount of business transacted by egg circles in Ontario during the first quarter of each year of the period 1915-1921, of which the following is a summary:—

Year	No. of members	Quantity shipped (dozens)	Gross Value to circle	Net Value to members
			\$	\$
1915	251	13,341	3,823.16	3,538.98
1916	479	34,640	10,564.19	10,439.84
1917	600	35,346	14,872.62	14,195.26
1918	888	44,309	23,052.00	21,813.39
1919	1,468	97,475	45,016.91	43,038.03
1920	1,065	57,711	36,557.47	34,886.23
1921	1,622	99,310	45,661.75	43,165.45

The Ontario Veterinary College, affiliated with the University of Toronto, is one of the oldest and most favourably known institutions of the kind on the American continent. It has received students from all parts of the English-speaking world, and its graduates are highly regarded, many of them having attained considerable prominence. It was first established at Toronto in 1862 as a private enterprise, and during the year 1908 was acquired by the Province of Ontario.

After carefully considering the essential requirements of veterinary education, training and practice, the Ontario Government, on the advice of the Minister of Agriculture,

decided a year or two ago to transfer the institution from Toronto to Guelph. A suitable site was provided, and the erection of the new college buildings, begun during 1921, has now been completed. The location, buildings and equipment combine in making what is generally considered to be one of the finest institutions of the kind. Being situated on "College Heights," adjacent to the Ontario Agricultural College and Experimental Farm, the representative collection of stock there maintained is available for instructional purposes, thus providing for greater expansion in the course of instruction.

Statistics as to dairying in the Province of Quebec show a considerable increase in the manufacture of butter and cheese in 1921 as compared with 1920. There were 674 creameries in operation, with 600,160 cows supplying them. The butter output was 42,575,392 pounds having a value of \$15,431,962 as compared with 41,632,511 pounds in 1920. The cheese production amounted to 53,525,706 pounds valued at \$8,188,983; increase 1,362,935 pounds.

A total of 164 persons, 112 men and 52 women, registered for the Winter Short Course, 1921-22 at Macdonald College. The registration by courses was as follows:

Course	Men	Women	Total
Home Gardening for Amateurs, Feb. 13 to 20 inclusive.....	22	22	44
Animal and Cereal Husbandry, Feb. 20 to 24 inclusive.....	29	0	29
Poultry, Feb. 20 to 24 inclusive.....	65	32	97
For Gardeners and Fruit Growers, Feb. 28, Mar. 1 and 2.....	15	4	19

During May a live stock improvement train, carrying Manitoba-raised pure-bred bulls of the leading breeds, will visit Manitoba points, under the direction of the Manitoba Department of Agriculture. The department will assist farmers in the purchase of pure-bred bulls, and will accept scrub bulls in exchange. The train will be equipped with motion picture machines, literature and demonstration cars.

During 1921 a total of 284 school exhibitions were held in the province of Saskatchewan. In the same period 64 Boys' and Girls' Clubs were active, their membership in 1920 totalling 1,098 and in 1921, 3,865. These clubs are active in the rearing of calves, pigs, sheep, colts and poultry, potato growing, gardening, canning, and stock judging.

THE AGRICULTURAL GAZETTE OF CANADA

The Agricultural Instruction Trains operated in 1921 by the Saskatchewan Department of Agriculture were as follows: Agricultural Instruction Cars, January 17 to March 26, attendance 12,265; Inter-provincial Weed Train, February 7 to 19, attendance 4,857; Better Farming Train, May 30 to July 2, attendance 32,774; Agricultural Instruction Cars, June 27 to July 27, attendance 4,327. These four enterprises cost the province, in the order named: \$2,115.56; \$1,599.44; \$12,876.59; and \$1,543.22. The railways supplied the equipment free of charge. The special trains were operated free of charge for a period of seven weeks. The railways also paid one-half of the advertising cost and furnished transportation for the staff of both trains and cars.

There are at present 187 Rural Education Associations in Saskatchewan, of which 170 held school exhibitions in 1921. The following figures show the growth of these Associations in numbers: 1916, 38; 1917, 57; 1918, 83; 1919, 118; 1920, 153.

During 1921 there were approximately 7,085,000 pounds of creamery butter manufactured in Saskatchewan. Of this amount 5,546,946 pounds or 78.3 per cent was graded by the official government graders. Regular butter grading depots are maintained at Regina and Saskatoon.

The grade certificate and the grading service furnish the creamery operator with an exact record of the work being done by each butter-maker, showing in detail all defects found in the butter.

Selling under Government grade certificate the manufacturer is in a position to ask the highest market price being paid for the various grades.

Fifty-nine herds in the Province of Saskatchewan have been under regular test for production of milk and butterfat since the work was taken over by the Provincial Department of Agriculture on May 1, 1921. This is an increase of 29 herds or 96.6 per cent over the number under test during the same period in 1920.

It is planned to develop this work further in a number of ways. In co-operation with the Saskatchewan Dairy Association, competitions are being conducted where awards will be offered for the highest average production per cow in whole herds and also for the highest individual records made by pure bred cows.

Through Boys' and Girls' Clubs it is planned to stimulate an interest in testing work and thus in herd management and herd improvement. The Saskatchewan Dairy Association offers prizes to boys or girls under sixteen years of age for the best kept herd record book. "Cow testing" is announced by the Director of Rural Educational Associations as a definite item on the programme of Boys' and Girls' Club work for 1922.

During the current year the following films were released by the Saskatchewan government: Nation Building in Saskatchewan; Household Science in Saskatchewan Schools; Farm Boys' Camps; Saskatchewan's Fight; the Provincial Sanatorium at Fort Qu'Appelle; Marketing Eggs; Grading Stallions; Selecting a Dairy Cow; Tree Planting; Better Bulls.

The government now owns twenty-six of these educational films, which were shown, without charge, during the current year to 51,182 persons.

At the annual convention of the Saskatchewan Dairymen's Association a resolution was adopted recommending the institution of a Chair of Co-operation and Markets at the University of Saskatchewan.

The Factory Class at the Ontario Agricultural College Dairy School in 1922 has been the largest for a number of years. Sixty-one students wrote on the final examinations. This is partly accounted for by the fire which destroyed the Eastern Dairy School at Kingston early in January, causing 24 members of that class to come to Guelph, of whom 22 wrote on the finals.

The number of registrations by Courses was as follows: Factory Course, 69; Farm Dairy, 17; Ice-cream and Soft Cheese, 19; Cow-testing, 27; Special Creamery Course, 54; Total, 186.

ASSOCIATIONS AND SOCIETIES

Ontario Seed Growers' Association.—Hon. President, W. J. Squirrel, Guelph; President, R. R. Moore, Norwich; Vice-President, J. W. Sangster, Listowel; Secretary, F. C. Hart, Toronto.

Ontario Corn Growers' Association.—Hon. President, Lester Gregory, Chatham; President, Stewart McDonald, Port Lambton; 1st Vice-President, Frank Weaver, Turnerville; 2nd Vice-President, Fred Ure, Maidstone; Secretary, W. H. Smith, Chatham.

Ontario Cattle Breeders' Association.—President, John Gardhouse, Weston; Vice-President, W. E. Thompson, Woodstock; Secretary, R. W. Wade, Toronto.

Ontario Horse Breeders' Association.—President, John A. Boag, Queensville; Vice-President, John Gardhouse, Weston; Secretary-Treasurer, J. E. Rettie, Toronto.

Ontario Berkshire Breeders' Society.—President, Adam Thompson, Stratford; Secretary, J. E. Rettie, Toronto.

Ontario Sheep Breeders' Association.—Secretary, R. W. Wade, Toronto.

Poultry Producers of Ontario.—President, Lewis N. Clark, Port Hope; Vice-President, Col. Thomas G. Delamere, Stratford; Secretary, Geo. W. Miller, Toronto.

Canadian Ayrshire Breeders' Association.—President, Gilbert McMillan, Huntingdon, Que.; Vice-President, J. L. Stansell, Stratford, Ont.; Secretary-Treasurer, W. J. F. Stephen, Huntingdon, Que.

Canadian Shire Horse Association.—President, G. E. Morden, Oakville, Ont.; Vice-President, W. J. Gardhouse, Weston; Secretary-Treasurer, G. deW. Green, Toronto.

Canadian Hereford Breeders' Association.—President, L. O. Clifford, Oshawa, Ont.; Vice-President, Walter Readhead, Milton; Secretary-Treasurer, H. D. Smith, Ancaster.

Canadian Swine Breeders' Association.—President, M. Ste. Marie, Compton, Que.; Vice-President, J. E. Brethour, Burford, Ont. Secretary-Treasurer, J. E. Rettie, Toronto.

Canadian Aberdeen-Angus Association.—President, Jas. Browne, Neudorf, Sask.;

Vice-President, G. C. Channon, Beauport, Ont.; Secretary-Treasurer, F. G. Crawford, Brandon, Man.

Canadian Co-operative Wool Growers' Association.—President, Lt.-Col. R. McEwen, Bryson, Ont.; General Manager, G. E. O'Brien, Toronto, Ont.

Canadian Pony Society.—President, Dr. W. J. R. Fowler, Toronto; Vice-President, J. E. Chandler, Hudson Heights, Que.; Hon. President, J. M. Gardhouse, Weston, Ont.; Secretary-Treasurer, G. deW. Green, Toronto.

Canadian Jersey Cattle Club.—President, G. D. Duncan, Todmorden, Ont.; 1st Vice-President, F. E. M. Robinson, Richmond, Que.; 2nd Vice-President, J. M. Dolson, Brampton; Secretary-Treasurer, B. A. Bull, Brampton.

Canadian Hackney Horse Society.—President, Dr. W. J. R. Fowler, Toronto; Vice-President, H. A. Mason, Scarborough.

Thoroughbred Horse Society.—President, J. J. Dixon, Toronto; Vice-President, A. F. Dymont, Toronto; 2nd Vice-President, R. M. Dale, Toronto; Secretary-Treasurer, T. J. McCabe, Toronto.

The Clydesdale Horse Association of Canada.—President, Dr. T. H. Hassard, Markham, Ont.; Vice-President, Walter Scott, Sutton West, Ont.; Secretary-Treasurer, J. W. Wheaton, Toronto.

Dual-Purpose Shorthorn Association.—President, G. L. Smith, Meadowvale; Vice-President, Ross Martindale, Caledonia; Secretary-Treasurer, I. B. Whale, London Ont.

Dominion Shorthorn Breeders' Association.—Hon. President, J. G. Barron, Carberry, Man.; President, H. M. Pettit, Freeman, Ont.; 1st Vice-President, Duncan Marshall, Olds, Alta.; 2nd Vice-President, John Gardhouse, Weston, Ont.; Secretary-Treasurer, Geo. E. Day, Guelph, Ont.

Holstein-Friesian Association of Canada.—President, A. E. Hulet, Norwich, Ont.; 1st Vice-President, R. W. E. Burnaby, Jefferson, Ont.; Secretary, W. A. Clemons, Brantford, Ont.

Yorkshire Breeders' Club.—President, H. A. Dorrance, Orangeville; Vice-President, D. L. Lerch, Preston; Secretary-Treasurer, J. E. Rettie, Toronto.

New Brunswick Fruit Growers' Association.—President, W. B. Gilman, Fredericton; Secretary-Treasurer, A. G. Turney, Fredericton.

New Brunswick Beekeepers' Association.—President, George L. Pugh, Nashwaaksis; Secretary-Treasurer, H. G. Miller, Fredericton.

Nova Scotia Poultry Association.—President, W. W. Osborne, New Glasgow; Secretary, J. P. Landry, Truro.

Alberta Cattle Breeders' Association.—Hon. President, Hon. George Hoadley, Minister of Agriculture for Alberta; President, G. H. Hutton, Calgary; First Vice-President, John Wilson, Innisfail; Second Vice-President, J. F. Day, Red Deer; Secretary-Treasurer, E. L. Richardson, Calgary.

Alberta Provincial Poultry Association.—President, Joseph Shackleton, Edmonton; Secretary, P. J. Timms, Calgary.

Alberta Hereford Breeders' Association.—President, John McD. Davidson, Coaldale; Secretary-Treasurer, Thomas Bellew, Calgary.

Manitoba Dairy Association.—President, E. Fotheringham, Brandon; Secretary-Treasurer, L. A. Gibson, Winnipeg.

Manitoba Poultry Breeders' Association.—President, N. W. Kerr, Brandon; Secretary, W. F. McGuinness, Brandon; Treasurer, J. F. McLean, Brandon.

Saskatchewan Ayrshire Breeders' Club.—President, W. H. Mortson, Fairlight; Secretary-Treasurer, E. Rogers, Lashburn.

Saskatchewan Holstein Breeders' Club.—President, B. H. Thompson, Boharm; Vice-President, W. H. Acres, Qu'Appelle; Secretary-Treasurer, C. W. Thurston.

British Columbia Dairymen's Association.—Hon. President, A. C. Wells, Sardis; President, P. H. Moore, Essondale; Vice-President, Mackintyre Dean, Keatings, B.C.

British Columbia Goat Breeders' Association.—President, W. H. Cottrell, Vancouver; Vice-President, C. H. Unwin, Victoria; Secretary-Treasurer, Geo. Pilmer, Dept. of Agriculture, Victoria.

British Columbia Ayrshire Breeders' Association.—Honorary President, A. C. Wells, Sardis; President, E. A. Wells, Sardis; Secretary-Treasurer, Prof. H. M. King, Vancouver.

British Columbia Entomological Society.—President, L. E. Marmont, Maillardville; Vice-President, R. S. Sherman, Vancouver; 2nd Vice-President, M. H. Ruhman, Vernon; Secretary-Treasurer, R. Glendenning.

Niagara District Grape Growers Limited.—President, G. A. Welstead, St. Catharines, Ont.; Vice-President, F. B. Cole, Louth; Secretary, W. C. Thompson, Beamsville, Ont.

Niagara Peninsula Growers Limited.—President, T. J. Mahony, Grimsby, Ont.; Vice-President, A. A. Craise, St. Catharines, Ont.; Secretary-Treasurer, G. G. Bourne, Grimsby, Ont.

NEW PUBLICATIONS

DOMINION DEPARTMENT OF AGRICULTURE

Experimental Station, Lacombe, Alta., 1920-21.—Report of the Superintendent, F. H. Reed, B.S.A.; Dominion Experimental Farms Branch.

Experimental Station, Lethbridge, Alta., 1920-21.—Report of the Superintendent, W. H. Fairfield, M.S., Dominion Experimental Farms Branch.

Bran, Shorts, Middlings and Feed Flour.—An Investigation Towards Revised Standards. By Frank T. Shutt, M.A., D.Sc.,

Dominion Chemist, and S. N. Hamilton B.A., Associate Chemist, Dominion Experimental Farms. Bulletin No. 2—New Series.

Record of Performance for Poultry Section "A," 1920-21.—Poultry Division, Live Stock Branch. The 1920-21 entries totalled 7,511 birds entered by 81 breeders, and of the 7,403 birds banded, 1,942 qualified for Record of Performance certificates, and 287 for Record of Performance advanced certificates. These figures show an increase over 1919-20 of 20.9 per cent in the number of breeders and 69.5 per cent in the number of birds entered.

THE AGRICULTURAL GAZETTE OF CANADA

ONTARIO

Ontario Fruit Growers' Association.—Fifty-second Annual Report, 1920.

Ontario Beekeepers' Association.—Forty-first Annual Report, 1920.

Beef Rings.—Circular No. 39. Co-operation and Markets Branch.

BRITISH COLUMBIA

Goat Raising in B.C.—Bulletin No. 64—Third Edition—Live Stock Branch.

Blackberry Culture.—Circular No. 57—New Horticultural Series.

Strawberry Culture.—Circular No. 58—New Horticultural Series—By E. W. White, District Horticulturist.

THE LIBRARY

LIST OF PRINCIPAL ACCESSIONS TO THE LIBRARY, INTERNATIONAL INSTITUTE BRANCH, DEPARTMENT OF AGRICULTURE, OTTAWA.

Plant Habits and Habitats in the Arid Portions of South Australia, by W. A. Cannon. Washington, Carnegie Institution, 1921. 139 pp. ill. (Publication 308). Bibl. pp. 138-9.

The Behaviour of Stomata, by J. V. G. Lotfield. Washington, Carnegie Institution, 1921. 104 pp. ill. (Publication 314). Bibl. pp. 103-4.

Shakespeare for Community Players, by Roy Mitchell. Toronto, J. M. Dent & Sons, Ltd. 1919. 142 pp. ill.

Agricultural bacteriology, by J. E. Greaves, M.S., Ph. D. New York, Lea & Febiger, 1922. 437 pp. ill.

Glue, gelatine and Their Allied Products, by Thomas Lambert. London, Charles Griffin & Co., Ltd., 1920. 153 pp.

Amelioration des plantes cultivees et du betail, par E. Coquide. Paris, J. B. Bailliere & fils, 1920. 607 pp. ill.

Guide to the Study of Animal Ecology, by G. C. Adams, Ph.D. Toronto, Macmillan Co. of Canada, 1913. 183 pp., ill.

The Vitamine Manual, by W. H. Eddy. Baltimore, Williams & Wilkins Co., 1921. 121 pp.

Animal Proteins, by H. G. Bennett, M.S. London, Bailliere, Tindall & Cox, 1921. 287 pp. (Industrial chemistry, ed. by S. Rideal).

Land Drainage, by W. L. Powers and T. A. H. Teeter. New York, Wiley, 1922. 27 pp. ill.

Farm Buildings, by W. A. Foster, B.Sc., and D. G. Carter, B.S. New York, Wiley, 1921. 377 pp., ill.

Allen's Commercial Organic Analysis, ed. by Henry Leffmann and W. A. Davis. London, J. and A. Churchill. 9 vols., ill.

History of the Frozen Meat Trade, by J. T. Critchell and Joseph Raymond. London, Constable, 1912. 442 pp., ill.

Bleaching, by S. H. Higgins, M.Sc. New York, Longmans, Green & Co., 1921. 137 pp.

Packing House and Cold Storage Construction, by H. P. Henschien. Chicago, Nickerson & Collins Co., 1915. 310 pp.

Export Packing, by C. C. Martin and others. Boston, Johnston export publishing Co., 1921. 723 pp. ill.

Market Analysis; Its Principles and Methods, by Percival White, A. M. New York, McGraw-Hill Co., inc. 1921. 340 pp.

Marketing Methods and Policies, by P. D. Converse. New York, Prentice-Hall, inc. 1921. 650 pp.

Marketing Agricultural Products, by B. H. Hibbard, Ph.D. New York, D. Appleton & Co., 1921. 389 pp.

Critical microscopy, by A. C. Coles, M.D., D.Sc. London, J. & A. Churchill, 1921. 100 pp. ill.

An Introduction to the Structure and Reproduction of Plants, by F. E. Fritsch, D.Sc. London, G. Bell & Sons, 1920. 458 pp. ill.

The Natural History of Plants, tr. from the German of A. K. von Marilaun, by F. W. Oliver, M.A., D.Sc. London, Gresham Publishing Co., 1895. 2 vols.

Strasburger's Textbook of Botany, rewritten by Dr. Hans Fitting, 5th ed. revised by W. H. Land, D.Sc. Toronto, Macmillan Co. of Canada, 1921. 800 pp. ill.

Nutrition de la plante; formation de substances ternaires, by M. Molliard. Paris, Librairie Octave Doin, 1921. 438, pp. ill.

Nutrition de la plante; échanges d'eau et de substances minérales, by M. Molliard. Paris, Librairie Octave Doin, 1921. 395 pp.

La destruction des mauvaises herbes, by E. Rabate. Paris, Librairie agricole de la maison rustique. 164 pp.

The Rothamsted Memoirs on agricultural Science, Vol. 10, 1916-1920. Harpenden, D. J. Jeffery, 1921.

Organic Evolution; Outstanding Difficulties and Possible Explanations, by Major Leonard Darwin. Cambridge, University Press, 1921. 47 pp.

Laboratory Manual in General Microbiology, 3d ed. New York, John Wiley & Sons, 1921. 472 pp.

The Peanut Plant, by B. W. Jones, N.Y. O. Judd Co., 1885. 69 pp. ill.

Quince culture, by W. W. Meech. New York, O. Judd Co., 1896 180 pp. ill.

Cranberry culture, by J. J. White. N.Y. O. Judd Co. 1885. 131 pp. ill.

How to make an orchard in British Columbia, by J. T. Bealby. London, A. & C. Black, 1912. 86 pp. ill.

Rural community organization, by A. W. Hayes. Chicago, University of Chicago press, 1921. 128 pp.

The economic history of China, by Mabel Ping-Hua Lee. New York, Longmans, Green & Co. 1921. 461 pp.

Northern Patagonia. Buenos Aires, 1914 464 pp. ill. maps.

An introduction to English rural history, by George Guest. London, Central book room, 1920. 68 pp.

Farm Sewage, by E. M. Santee. N.Y. O. Judd Co. 1912. 32 pp. ill.

The structure of Wool Fibre, by F. H. Bowman. Toronto, Macmillan Co. of Canada, 1908. 475 pp. ill.

The History of Wool and Woolcombing, by James Burnley. London, Sampson, Low, Marston, Searle & Rivington, 1889. 487 pp. ill.

The Textile Fibres of Commerce, by W. I. Hannan. London, C. Griffin & Co., 1902. 236 pp., ill.

The Fibre Plants of India, Africa and Our Colonies, by J. H. Dickson. London, William McIntosh, 1885. 400 pp.

Wool and Cotton in All Forms From Yarn to Fabric. New York, William Whitman Co., 1921. 177 pp. ill.

Inspection des viandes et des aliments d'origine carnee, by M. Piette. Paris, J. B. Bailliere & fils, 1921. 439 pp. ill.

Food Products, by H. C. Sherman. Toronto, Macmillan Co. of Canada, 1920. 594 pp. ill.

Le controle du lait, by P. Dornic. Paris, J. B. Bailliere et fils, 1921. 164 pp. ill.

Index generalis, comp. by R. de Montessus de Ballore. Paris, Gauthier-Villars et cie, 1921. 1845 pp.

A Manual of Photographic technique, by L. J. Hibbert. Toronto, Sir Isaac Pitman & Sons, 1921. 118 pp. ill.

Manual of Tropical and Sub-Tropical Fruits, by W. Popenoe. Toronto, Macmillan Co. of Canada, 1920. 474 pp. ill.

La taille des arbres fruitiers de plein vent, by E. Rabate. Paris, Librairie agricole de la maison rustique. 165 pp., ill.

Nut growing, by R. T. Morris. Toronto, Macmillan Co. of Canada, 1921. 233 pp. l.

Langstroth on the Hive and Honeybee; 21st ed. rev. by C. P. Dadant. Hamilton, American bee journal, 1922. 436 pp., ill.

The Complete Dog Book, by Dr. W. A. Bruette. Cincinnati, Stewart & Kidd Co., 1921. 353 pp. ill.

History of the Poland China Breed of Swine. Omaha, Poland China history Association, 1921. 278 pp. ill.

Les Equides Domestiques, by A. Gallier. Paris, Octave Doin et fils, 1919. 374 pp., ill.

A Ranchman's Recollections, by F. S. Hastings. Chicago, Breeders' Gazette, 1921. 235 pp. ill.

The Passing of the Old West, by H. G. Evarts. Boston, Little, Brown & Co., 1921. 234 pp. ill.

The Romance of Western Canada, by R.G. McBeth. Toronto, Ryerson press, 1920. 309 pp.

Roof framing and polygon miters, by G. D. Mills. St. John, N.B. J. A. McMillan, 1920. 57 pp. ill.

Sewers and drains, by A. Marston. Chicago, American technical society, 1918. 197 pp. ill.

Diet and Health, by L. H. Peters, M.D. Toronto, Copp Clark Co., 11th ed., 1922. 127 pp. ill.

Analyses and Energy Values of Foods, by R. H. A. Plimmer. London, H. M. Stationery Office, 1921. 255 pp.

Ventilation, Weather and the Common Cold, by G. T. Palmer. Detroit, Dept. of Health, 1921. 39 pp. ill.

The Sieve or Revelations of the Man Mill, by F. F. Weiss. Boston, Page Co., 1921. 307 pp. ill.

Free Trade, the Tariff and Reciprocity, by F. W. Taussig, Ph. D. Toronto, Macmillan Co. of Canada, 1920. 219 pp.

Rural Organization, by Walter Burr. Toronto, Macmillan Co. of Canada, 1921. 250 pp.

Mathematics for Students of Agriculture, by S. E. Rasor. Toronto, Macmillan Co. of Canada, 1921. 290 pp.

The Grange Master and the Grange Lecturer, by Jennie Buell. New York, Harcourt, Brace & Howe, 1921. 178 pp.

What the Wild Flowers Tell Us, by D. C. Osterheld. New York, Fleming H. Revell Co., 1921. 191 pp. ill.

Fences, Gates and Bridges, by G. A. Martin. New York, O. Judd Co., 1887. 192 pp., ill.

Farm Conveniences. New York, O. Judd Co., 1884. 256 pp. ill.

Farm Appliances, by G. A. Martin. New York, O. Judd Co., 1887. 192 pp. ill.

The Hop, by Herbert Myrick. New York, O. Judd Co., 1899. 300 pp. ill.

Les plantes en medecine; le seigle et l'ergot, by A. Garrigues. Paris, Octave Doin, 1921. 252 pp. ill.

Hemp, by S. S. Boyce. New York, O. Judd Co., 1900. 112 pp. ill.

The Study of Corn, by V. M. Shoemith. New York, O. Judd, Co., 1910. 96 pp.

Champignons comestibles, by A. Sancey. Paris, Maloine et fils, 1921. 270 pp. ill.

The Physical Properties of Soils, by A. G. McCall. New York, O. Judd Co., 1919. 102 pp. ill.

The Ice Crop, by T. L. Hiles. New York, O. Judd Co., 1908. 122 pp. ill.

The Demonstration Work, by O. B. Martin. Boston, The Stratford Co., 1921. 269 pp.

The Affable Stranger, by Peter McArthur. Toronto, Thos. Allen, 1920. 216 pp.

Cultivation of the Dahlia, by C. B. Bolles. Media, Pa. 48 pp. ill.

Traffic Geography, by E. J. Martin and E. G. Ward. Chicago, American Commerce Association, 1921. 321 pp.

Marketing Agricultural Products, by B. J. Hibbard. New York, D. Appleton & Co., 1921. 389 pp.

Fossil Echini of the West Indies, by R. T. Jackson. Washington, Carnegie Institution, 1922. (Publication 306).

Land Magnetic Observations, 1914-1920, by L. A. Bauer and others. Washington, Carnegie Institution, 1921. 475 pp. ill. (Publication 175).

Shallow-water Foraminifera of the Tortugas region, by J. A. Cushman. Washington, Carnegie Institution, 1922. 85 pp. ill. (Publication 311).

Carnegie Institution of Washington, *Year Book No. 20*, 1921. 475 pp.

The Consortium; the official text of the four-power agreement for a loan to China and relevant documents. Washington, Carnegie Endowment for International Peace, 1921. 76 pp. (Pamphlet 40).

A guide to the poisonous plants and weed seeds of Canada and the Northern United States, by R. B. Thomson, B.A., F.R.S.C. and H. B. Sifton, M.A. Toronto, University of Toronto Press, 1922. 169 pp. il.

PART V

The International Institute of Agriculture

FOREIGN AGRICULTURAL INTELLIGENCE

All communications in regard to this section should be addressed to T. K. Doherty,
International Institute Commissioner, Department of Agriculture,
West Block, Ottawa.

CROPS AND CULTIVATION

245.—Development of Agricultural Meteorology in the United States.—WARREN SMITH, J., in *Monthly Weather Review*, Vol. 48, No. 5, pp. 281-283. Bibliography of 46 works, Washington, May, 1920.

The present U.S. Weather Bureau was inaugurated by an act of Congress on February 9, 1870, authorizing the Secretary of War to organize a meteorological service throughout the United States.

The Iowa Weather Service was established in 1875; the Nebraska Service in 1878, the Missouri Service in 1877, and the Ohio Service in 1882.

By 1891 a special weather and crop service was in operation in nearly every state; the publication of Weather and Crop Bulletins was already started in 1887.

On July 1, 1891, all the meteorological work of the Signal Service was transferred to the Department of Agriculture and the present United States Weather Bureau was put into operation. Since this transfer, the work of the Weather Bureau in its relation to agriculture has developed steadily, and special services have been established for the direct benefit of areas devoted to maize and wheat, cotton, sugar and rice, cattle, tobacco and fruit.

Special forecast and warning services have been inaugurated for tobacco, fruit and truck growers; alfalfa and rice harvesting; fruit spraying, alfalfa seed harvest and sheep shearing, etc.

The present Division of Agricultural Meteorology was established as a new division in the Weather Bureau on February 23, 1916 (1). The National Weather and Crop Bulletin has been developed to show the effect weekly upon growing crops, and studies are being made to find the most critical period of growth of the various crops and the weather most affecting them. Detailed temperature and moisture surveys are being carried on in citrus and deciduous orchards to determine the distribution of damaging weather factors, the effect of

orchard heating on the temperature, and the part that radiation plays in temperature variations and fruit protection.

Valuable studies in the forecasting of minimum temperatures have been published and equations evaluated from the knowledge of the moisture in the atmosphere in the afternoon and its relation to the temperature variations during the following night.

246.—Apparatus for Protection from Frost in the United States.—KIMBALL, H. H., and YOUNG, F. D., in *Monthly Weather Review*, Vol. 48, No. 8, pp. 461-462. Washington, August, 1920.

There are three quite different types of oil burning heaters in general use on the Pacific Coast.

(1) High stack heater, with an abundant draught, resulting in almost complete combustion of the oil, and the formation of only light smoke;

(2) Lard-pail heater, with insufficient draught for complete combustion and a dense smoke.

(3) Short-stack heater, intermediate.

Which of these three types is to be preferred? The experiments conducted at the Stations of Pomona, Cal., and at Medford, Ore., are very interesting in this respect. The results obtained may be summarized as follows:—

(1) The presence of a dense smoke cloud diminished nocturnal radiation on an average about 0.011 calories per minute per sq. cm. of surface, with maximum effects of nearly 0.030 calories.

(2) At a distance of 10 ft., the intensity of radiation from a lard-pail heater is about 0.080 calories per minute per sq. cm.; from a short stack, about 0.100 calories; from a high stack, 0.300 calories.

(3) Since the intensity of radiation varies inversely as the square of the distance from the source of heat, at a distance of 15 ft. from the heaters it will be less than half at 20 ft., i.e., about $\frac{1}{4}$ that given above.

(4) The heating by radiation is in addition to the heating by conduction and convection

(1) A Division of Agricultural Meteorology was established by the Canadian Weather Bureau at the instance of the International Agricultural Institute in 1914.

of hot air and gases from the burning oil in its immediate vicinity.

It may therefore be concluded that the retardation of nocturnal radiation by the smoke cloud plays an insignificant part in frost protection. The important point is the heat which emanates directly from the radiators; high stack heaters may therefore be recommended. These possess the advantage of avoiding the production of dense smoke clouds which might prove decidedly disagreeable in a populated area.

363.—Theory of Injury Due to Freezing of Fruit Buds From the Protection Stand-point.—WEST, F. L., and EDLEFSEN, N.E., in *Journal of Agricultural Research*, Vol. XX, No. 8. Washington, D.C., January 15, 1921.

Introduction.—The late spring frosts and the early autumn frosts cause damage to the extent of several millions of dollars annually in the United States. The commonest method of protection is to heat by burning oil in pots distributed through the section that is endangered. This method is resorted to on a large scale in the citrus fruit sections of California, and less frequently elsewhere for the protection of such fruits as apples, peaches, and cherries.

The success of this practice depends on the economical use of fuel and labour, and it can only be employed in cases of urgent need.

If the predicted minimum temperature is lower than the "critical temperature" or if the predicted minimum temperature is above the "critical temperature," in both cases it is useless to light the heaters.

It is, therefore, indispensable to know first the degree of resistance of the fruit trees at various stages in their development. Thanks to the previous investigations made by other authorities, it has been possible to draw up a classified list of the "danger points" for various kinds of fruit:—

(1) At the time when the petals are closed but showing colour:—apple 25° F. to 27° F.; peach 26° F. to 29° F.; cherry 22° F. to 29° F., pear 25° F. to 29° F., plums and apricots 22° F. to 30° F.

At time of blossoming: apple and pear 28° F. to 29° F., peach 27° F. to 30° F., cherry 28° F. to 30° F., apricot and plum 28° F. to 31° F.

Fruit setting: apple and cherry, 28° to 30°; peach 27° to 30°; pear 28° to 29°; plum 28° to 31°; apricot 28° to 32°.

This paper gives the methods used and the results obtained by freezing on 24,000 fruit buds, most of them being apples and peaches, and also observations on the spring temperatures and yields of fruit in orchards near Logan, Utah (1913 to 1920).

Methods Employed.—(1) Detaching branches with fruit buds in the laboratory

by means of a specially designed thermostat, the air surrounding the buds being cooled by means of common salt and ice. The extent of the injury was determined by cutting the buds open and counting those that had been damaged and then calculating the percentage frozen.

(2) Branches of trees were bent down into a vessel surrounded by a second air chamber; the latter being surrounded by a mixture of ice and salt. The minimum temperature was noted, the branch tagged, and the further development of the buds was observed and the yield of fruit determined.

(3) Modified method No. 2. Instead of using ice and salt, the buds were cooled by means of evaporating liquid carbon dioxide which in a very cold gaseous condition cooled the buds to the desired temperature.

(4) Freezing the whole tree by surrounding and covering it with a 2-walled metal vessel containing ice and salt.

The factors that determine the amount of damage done are:

- (1) Kind of buds.
- (2) Stage of development.
- (3) Minimum temperature.
- (4) Humidity.
- (5) Duration of frost.
- (6) Rate of thaw.

Results.—General conclusions may be drawn after examination of the numerous experimental data collected in this way.

(1) Ben Davis apples in full bloom have experienced temperatures of 25°, 26° and 27° F. without injury, and 25° kills about $\frac{1}{2}$ and 22° F. about $\frac{9}{10}$. On several occasions, however, apples matured on branches at a temperature of 20° F.

(2) With Elberta peaches in full bloom, 29° F. or above are safe temperatures. A temperature of 28° F. will kill from $\frac{1}{2}$ to $\frac{3}{4}$; 26° F. kills $\frac{1}{2}$ and 22° F. about $\frac{9}{10}$.

(3) With sweet cherries in full bloom, 30° F. is the safe temperature, but 29° F. usually kills about $\frac{1}{2}$ and 25° F. about $\frac{1}{2}$.

(4) Sour cherries are harder than the sweet varieties in full bloom; 26° F. killed only $\frac{1}{2}$, and 22° F. only $\frac{1}{2}$ of them. When the buds were showing colour 23° F. did not harm them.

Sour cherries are the hardiest, and then follow in order apples, peaches, apricots and sweet cherries.

(5) With apricots 29° F. is the safe temperature; 26° and 27° F. killed about $\frac{1}{2}$ and 22° killed $\frac{1}{2}$. They are, therefore, fairly hardy, but they bloom so early that they are more exposed to the late spring frosts than other fruits.

(6) All the foregoing figures refer to the buds when in full bloom. Starting from this stage, the earlier the stage of development the harder are the buds, but when the fruit is setting the injury is from 5 to 10% more than when they are in full bloom.

394.—Studies on Manuring Tobacco.—I.

WIMMER, G., in *Mitteilungen der Deutschen Landwirtschafts-Gesellschaft*, Year 36, No. 10, pp. 166-168. Berlin, March 6, 1921.

II. VAN DIJK, J., in *Medeelingen van het Deli Proefstation temedan Sumatra*, Series 2, No. 14, pp. 3-38, Year 1910.

I.—Results of the Experiments Hitherto Made in Manuring Tobacco. The Present State of our Knowledge on the Subject.—The basal manure used for tobacco crops is a dung poor in chlorides, preferably mixed (horse and cow dung).

Nitrate of sodium is little used, partly on account of the fact that tobacco treated with it often burns badly, probably because of the easily fusible deposit of alkali nitrates on the leaves, and because the leaves dry badly.

Sulphate of ammonium (50 to 100 lb. per acre) or Norwegian calcium nitrate (in double the quantity) are employed; the latter is very suitable, on account of its high lime content. The author found, as a result of many experiments, that ammonium nitrate makes the cigars burn quicker. Good results have been obtained from cyanamide, and much is hoped from synthetic urea. No conclusive proof has been obtained as to the effect of green manures on the burning properties of tobacco.

Potassic fertilizers are very necessary for tobacco. In Alsace, the fields where this crop is to be cultivated are given in the autumn 350 lbs. per acre of potassium silicate ("martelline") in addition to stable manure. Sulphate of potassium is not used, as it is supposed to impart an astringent taste to the tobacco, which, however, has not been observed in Germany.

Experiments were made by Kitzinger for the purpose of determining the effect of manuring upon the quality of cigars, but all smokers are not of the same mind as to the results. Further, the results of tests as to efficacy of potassium carbonate are not in agreement.

A heavy application of stable manure renders the use of a phosphatic fertilizer unnecessary. Where, however, such fertilizers are necessary, it is advisable to choose Peruvian guano and scories, and to avoid fertilizers containing a large amount of sulphates.

As the tobacco plant is calciphilous lime should be added to the soil, if the latter is deficient in calcium.

All these rules as to manuring are of secondary importance in comparison with the method of drying the tobacco during

and after growth, especially from the point of view of its burning properties, the chief quality required in smoking tobacco.

II.—Manuring Experiments Carried out in Tobacco Fields.—Experiments were made in Sumatra, in 1919, in order to observe the effect of manure upon leaf production and the vigour of the stem. The fertilizers used were superphosphates, ashes, ammonium sulphate and guano.

The best results were obtained, as regards stem growth by a fertilizer containing nitrogen, phosphoric anhydride and potassium in the proportions 1 : 3.6 : 1.

A fertilizer in the proportions 1 : 3.3 : 1, however, generally improved the combustibility of the fermented tobacco.

An excess of superphosphate hinders the growth of the plant.

265.—Action of Chloropicrin on the Germination Power of Seed.—MIEGE, E., in the *Comptes rendus de l'Academie des Sciences* Vol. CLXXII, No. 3, pp. 170-173. Paris, Jan. 17, 1921.

Various workers have shown that chloropicrin is a powerful insecticide which is effective for the destruction of certain parasites. The action of chloropicrin on the germination power and the cultural value of seeds, however, remained to be determined.

In a previous experiment on a large scale several quintals of different infested seeds (pea, bean, wheat, etc.) were treated, either by watering the closed sacks, in the way indicated by M. G. Bertrand, or by placing the chloropicrin in vessels placed close to them. With a dose of 20 cc. per cubic metre of space, or per sack of about 80 kg. the pea-weevil (*Bruchus pisi*), bean-veevil (*Br. obtectus*) and the grain-weevil (*Calandra granaria*) were, in both cases, radically destroyed within 24 hours without any apparent harm to the germination power. The wheat alucide (*Sitotroga cerealella*) was also completely destroyed under similar conditions.

In a second series of experiments in the laboratory, samples of seeds of various cultivated plants were placed in dishes under a bell-jar and treated for varying periods with chloropicrin in doses varying from 15 to 50 cc. per cubic metre. Afterwards the seeds were removed and put to germinate under filter paper, in the open air without artificial heat, and compared with untreated controls. The following tables give the results obtained.—

THE AGRICULTURAL GAZETTE OF CANADA

TABLE I.—Germination power after treatment with 15 cc. of chloropicrin per cubic metre.

Duration of treatment	Wheat	Rice	Hemp	Flax	Lentils	Fenugreek	Bersim
Control.....	100	80	69	100	100	100	100
6 hours.....	93	84	50	100	100	100	100
12 ".....	82	79	61	100	100	100	100
24 ".....	70	79	58	100	100	100	100
48 ".....	66	60	54	100	100	100	100
72 ".....	69	39	65	100	100	100	100
96 ".....	71	38	64	100	100	100	100

TABLE II.—Germination power after treatment with 50 cc. of chloropicrin per cubic metre

Duration of treatment	Wheat	Beet	Flax	Lentils	Fenugreek	Bersim
Control.....	100	72	100	100	100	100
6 hours.....	34	61	95	99	100	100
12 ".....	36	65	96	100	100	100
24 ".....	32	58	91	100	100	100

The results show that the destruction of insects parasitic on seeds (wheat and bean weevils, alucides, etc.) is assured by the use of chloropicrin, acting for 24 hours in

doses of 15 to 20 cc. per cubic metre. Longer periods of contact and larger doses do not appear to be any more effective.

TABLE III.—Germination power of wheat treated with 20 cc. of chloropicrin per cubic metre

Appearance of first sprout	Reference	6 hours	12 hours	24 hours	48 hours	72 hours	96 hours
	3rd day	2nd day	3rd day	3rd day	3rd day	4th day	5th day
No. of germinations after							
4 days.....	54	65	40	53	25	7	0
6 days.....	73	77	69	58	49	40	24
8 days.....	85	84	76	65	58	54	50
10 days.....	94	88	80	71	62	57	62

The action of the chloropicrin on the seeds varies with their nature, the dose given, and the duration of treatment. Certain seeds of legumes, flax, etc., are not affected by it, but on others, such as hemp, beets, etc., and, in particular, cereals it affects the germination energy and power. This unfavourable influence increases, with the quantity used and the time of contact.

Under the conditions required for disinfection the germination power of wheat is decreased by 30%, a percentage which increases with stronger doses. On the other hand leguminous seeds are absolutely immune.

479.—Inheritance of Resistance to Bunt or Stinking Smut of Wheat, in the United States.—GAINES, E. F., in *Journal of the American Society of Agronomy*, Vol. 12, No. 4, pp. 124-132. Washington, D.C., April 1920.

Details of the experiments are given, and the author concludes as follows:

(1) Bunt resistance in wheat is not a simple Mendelian unit character.

(2) Resistance, if Mendelian, is composed of multiple factors, for a continuous series ranging from complete immunity to complete susceptibility has been obtained.

(3) Different wheat varieties possess different kinds of resistance.

(4) Linkage between resistance and morphological characteristics is not sufficient to prevent the selection of a resistant strain of any morphological type desired.

278.—Results of Crossing the Raspberry Cuthbert With Salmonberry *Rubus Spectabilis* in Alaska.—GEORGESON, C. C., and BENSON, C. H., in *Report of the Alaska Experiment Station*, 1918, pp. 23-24. Washington, September 1920.

In 1909, crosses were made at the Sitka Experiment Station between the salmonberry (*Rubus spectabilis*) and raspberry var. Cuthbert; the results were, however, unsatisfactory. On many plants blossoms were sterile and failed to set fruit; others were indifferent bearers, and none of them had any qualities that made them superior to good raspberries.

In 1918, however, one hybrid from a cross made in 1916 promised to be of value; the berries were salmon coloured, and of good size and pleasant flavour. This plant was a strong grower and showed some of the characteristics of both parents.

492.—**The Influence of Size and Character of Seed on the Yield of Potatoes.**—SALAMAN, R. N., in *The Journal of the Ministry of Agriculture*, Vol. XXVIII, No. 1, pp. 43-48. London, April, 1921.

In 1920, a preliminary investigation of the above problem was begun. For this purpose a stock of new variety (1) was employed which had been grown in Barley, Herts, the previous year; the tubers had been clamped during the winter and sprouted in the spring.

This main crop variety was well adapted to this type of experiment for two reasons; it is an exceptionally heavy cropper and it is extremely resistant to leaf roll and mosaic disease. The tubers are white kidney and are immune to wart disease.

Selections of the seed tuber were made by the author according to various grades, and the number of tubers in every unit weight of seed was carefully checked. The tubers were selected both for size and weight so that each class was as uniform as possible. The classes selected were (1) 0.4 oz.; (2) 1.3 oz.; (3) 2 oz.; (4) 2.6 oz.; (5) 4 oz.; (6) 5.3 oz.; (7) 5.6 oz.; (8) 6 oz.; (9) mixed seed of all sizes.

The results of the experiments so far as this first year allows of conclusions, are:—

(1) That although small chats give a big return in proportion to their weight as seed, and produce as much, in this experiment even more, big ware than any class of seed, yet it is certainly not economical.

(2) The best seed class are tubers of 2 oz. in weight and these give the best returns, excepting the large tuber sets with secondary growths.

(3) Seed tubers over 2 oz. in weight give smaller crops whilst the amount of seed is progressively greater. The amount of heavy ware is progressively less, both actually and relatively.

(4) The tendency to secondary growth formation is not conveyed to the crop from the seed tuber. It is a peculiarity of big tubers and is not directly influenced by the size of the seed tuber. That the sets with secondary growth should have proved such successful seed is, however, not surprising as they naturally indicate a high vegetative activity on the part of the parent tuber, which experience has long shown to be the best type of tuber seed. Seed tubers with secondary growth make exceedingly good seed, and apart from the fact that they are

large and wasteful without cutting, the evidence would tend to show that their use as seed is strongly indicated.

As the value of a potato crop is concentrated in the main on the quantity of the large ware size tubers formed, it is of interest to refer to the table where the percentage of the entire crop represented by the tuber of 4 oz. and over is shown. The highest value, 73% of the total crop is given by seed tubers of less than 1 oz. in weight, i.e. by chats, so that it would appear that the larger the set, the smaller the quantity of big ware. When, however, the fact is taken into account of the bigger crop from the 2 oz. sets, the total yield per acre of large ware is considerably greater in this than in any other class. If, however, cut tubers with secondary growth will yield in the same manner as the large ones of class 8, then the advantage of such sets might at least equal that of the 2 oz. set in the production of heavy ware.

The crop of a potato plant must be expressed in the quantity of tuber material produced, and its subdivision into tubers depends on other factors and is probably influenced by environment. The general approximation of the numbers of tubers in the classes of the crop from mixed seed, with that of the average of the 8 seed classes, is a fact of considerable interest.

289.—**Growing of Sunflowers (*Helianthus annuus*) in Montana and Use as Silage.**—ATKINSON, A., NELSON, T. B., ARNETT, S. N., JOSEPH, W. E., and TRETSYEN, O., in *University of Montana Agricultural Experiment Station*, Bulletin No. 131, pp. 3-29. Bozeman, Montana, April, 1919.

A brief survey of the characteristics and history of the cultivated sunflower, followed by the results of tests on yields and methods of growing and feeding, as employed at the Montana Experiment Station.

Preliminary tests were carried out from 1915-18 inclusive, to find the crop yield. A comparison of yields shows that while the heaviest yield is from the earliest planting, there are peculiar variations as the date of planting advances. Observations on the growth of the crop led the authors to recommend that planting should be made in the higher altitudes, where the season is short, and as soon as the ground has become warm and is in good condition in the spring. After planting in rows and drills at different distances apart, it was found that the largest returns, 44.1 tons per acre, was obtained from those planted in rows 36 inches apart, and in drills from 30 to 36 inches apart and 4 to 5 inches between seeds. In date-of-seeding tests, the largest yields were produced from the earliest plantings.

(1) This potato is not, as yet, on the market (Author's note).

Dry land tests were made in 1918 on 13 different farms in 8 counties, and over 30 acres were planted. The average yield was 10.3 tons per acre. As this was a season of unusually low moisture precipitation, the authors consider it reasonable to conclude that sunflowers are a promising dry land forage crop.

Seed matured only one out of 4 years at the Bozeman Station. From observations, however, it appears that seed should mature regularly in the lower valleys where the temperature is higher and when there is a longer period free from frost.

Practical and experimental results up to date, feeding qualities, yields per acre and

frost resisting qualities, all considered, were greatly in favour of sunflowers compared with other silage crops. It was successfully used in winter feeding practically with every class of farm stock, but it was found better to make a combination with dry roughage such as clover, alfalfa, or mixed hay.

Mammoth Russian sunflowers were successfully used for both soiling and silage purposes during the 4 years trial. Silage made from plants 30% in bloom, compared favourably in digestible nutrients with maize silage made from immature maize.

Digestible Nutrients	Total dry substance	Crude protein	Crude fibre and nitrogen free extract	Ether extract	Nutritive ratio
In 100 lbs. of sunflower silage.	21.4	1.24	10.13	0.37	9.8
In 100 lbs. silage from well matured maize	26.3	1.1	15.00	0.70	15.1
In 100 lbs. silage from immature maize.	21.0	1.0	11.40	0.40	12.3

No difficulty was experienced in getting cattle, sheep, or pigs to eat this silage. Some animals required a few days to become accustomed to it, while others ate readily the first time it was offered. No objectionable flavours or odours could be detected in milk from cows fed this.

Experiments were conducted from 1916-1918 to determine the relative feeding value of sunflower silage, clover hay and alfalfa hay. Results showed that 3.75 lb. of sunflower silage was equal to 1 lb. of choice alsike clover hay, when fed to cows receiving grain and a limited hay ration, and 2.83 lb. was equal to 1 lb. of alfalfa hay.

Chopped green sunflowers 30 to 40% in bloom, were equal to chopped green corn in the roasting ear stage as a soiling crop for dairy cows. Experimental work up to the present, indicated that 30% in bloom has a higher feeding value than silage made from plants less mature. The exact stage of growth that will give the highest quality of silage has not yet been determined; experiments are now in progress.

The silage was found a valuable substitute for part of the hay ration for breeding ewes and brood sows; 2.5 lb. of silage replacing 1 lb. of alfalfa hay in an entirely satisfactory manner.

The most practical method of harvesting sunflowers was found to be with the ordinary corn binder.

290.—**Flax Growing Experiments in Ireland, 1915-1919.**—*Department of Agriculture and Technical Instruction for Ireland, Journal*, Vol. XX, No. 3, pp. 351-361. Dublin, 1920.

I.—**Manurial Experiments.**—A summary of the results obtained from the 4 series of

experiments conducted by the Department during the years 1901-1915 inclusive, led to the following recommendations with regard to the advisable manurial applications to be made to the flax crops per statute acre. (1) On soils in good condition, 1-1½ cwt. muriate of potash or 4-5 cwt. kainit; (2) on poor or medium soils 1-1½ cwt. muriate of potash or 4-5 cwt. kainit and ½ cwt. sulphate of ammonia. In the second case, the mixtures of potassic manures and sulphate of ammonia should be applied a short time prior to sowing the crop.

In 1917, trials were carried out at three centres to compare the results obtained from ground rock (containing about 5% potash), with those from sulphate of potash. The first was applied at rates of 10 cwt., 1 ton and 5 tons per statute acre respectively both singly and in combination with lime. The results of these trials afforded no evidence that dressings of ground rock containing potash would serve as a substitute for dressings in the ordinary soluble potash manures.

In 1919, trials were carried out at 5 centres in which kelp, flue dust, muriate of potash, and sulphate of ammonia + muriate of potash were compared as top dressings for flax. Each of the dressings of potash manures used was equivalent in potash content to a dressing of 1 cwt. per statute acre of muriate of potash containing 50% potash. The variety of seed used was Dutch, showing a germination % of 95. This was sown at the rate of 54 qts. per statute acre. Results showed that the brairds on the unmanured plots were severely affected with yellowing, but no trace of this disease was observed on any other plots dressed either with muriate of potash or

kelp. Where flue dust was used there was a slight touch of yellowing.

After deducting the cost of manures, the various manurial dressings gave the following profits per statute acre:

Muriate of potash + sulphate of ammonia.....	\$60.00
Muriate of potash.....	43.20
Kelp.....	40.10
Flue dust.....	8 65

II.—*Seed Trials 1915-1919.*—In addition to Dutch, Russian and Irish, the varieties of seed of the fibre variety tested included British-East African, Canadian (Ontario), Canadian Western Fibre, Canadian Riga Child (Prov. Saskatchewan), Dutch (White Flowering), English, French, Scottish, and United States seed. The following seed varieties of flax were also tested; Minnesota 25, Canadian Common and Argentine; but none of these gave results that would warrant their being recommended for sowing for fibre purposes. Dutch seed was included in each set of trials each year for comparison purposes.

The variety tests were carried out on different classes of soil, and the results obtained, taken in conjunction with those of previous years, affords conclusive proof that no special variety is specially suitable for a particular class of soil. The relative merits of the various kinds of seed varied from year to year. The largest monetary return was obtained from English seed in four of the five years trials. Of the Dutch varieties, the white flowering variety gave substantially the largest in 2 of the years and slightly lower than the flowering variety in the third year. The white variety produced taller and slightly more branched flax, and was about 10 days later in ripening than blue. Neither the French nor the U.S.A seed gave as good results as the Dutch.

Pure line seed trials were carried out in 1919. The Department's pure lines Nos. 3 and 5 showed a striking uniformity of flax straw compared with that grown from any of the commercial varieties, and from these results it is clearly evident that the flax crop can be greatly improved through the propagation of pure line seed from single selected plants.

LIVE STOCK

319.—*The Efficiency of Purdue Calf Meal as a Milk Substitute in Calf Feeding.*—SPITZER, G., and CARR, R. H., in *Bulletin* No. 246, pp. 1-8, Lafayette, Indiana, 1920, and reviewed in *Experiment Station Record*, Vol. 43, No. 91, pp. 875-876. Washington, 1921.

Purdue calf meal consists of maize meal, linseed meal and liquid beef blood (8 : 1 : 12) plus steam ground bone to the extent of

1%. This is dried for from 4 to 6 hours at a temperature not over 140° F., and then ground.

An hour or so before feeding it is mixed with 4 times its weight of warm water, forming a jelly. This is again diluted at feeding time and is fed at blood heat. Liquid blood meal thus prepared, was more readily digested than commercial dried blood.

A group of 36 grade Holstein calves varying in age from 10 to 20 days, and in weight from 85 to 126 lb. were fed for 140 days. A lot of 12, receiving whole milk throughout, showed an average gain of 1.91 lb. per head. A similar lot fed on skim-milk, after the first 10 days showed an average daily gain of 1.73 lb. and a third lot fed on Purdue calf meal gained 1.18 lbs.

Ground maize and oats (1 : 1) was fed as a dry mash to each lot, and for part of the time the calves had access to bluegrass pasture (*Poa pratensis*) or clover hay.

The calf meal lot were thrifty and remained in good condition, and during 6 months of pasture following the feeding period, they gained about the same amount as the other lots.

413.—*The Value of the Purebred Sire in Increasing the Production of a Scrub Herd.*—MCCANDLISH, A. C., in *Journal of Dairy Science*, Vol. IV, No. 1, pp. 12-23. Baltimore, Jan., 1921.

Report of experimental tests made at the Iowa Station mating scrub cows purchased in Arkansas to purebred dairy bulls of the Holstein, Guernsey and Jersey breeds, with a view to testing their value as regards increasing producing ability of the herd (milk and butterfat).

A number of grade animals sired by purebred bulls (Holstein, Guernsey or Jersey) and descended from scrub cows was studied in two groups: the first generation grades, i.e. those carrying 50% of blood of one of the recognized dairy breeds, and the second generation grades i.e. carrying 75%.

First Generation Grades.—Purebred Holstein bull X scrub cow, showed in the first generation an increase over their dams in milk and butterfat production, with an average of 89% in milk and 58% in fat. In the case of F₁ of Guernsey grade X scrub cow, the average increase in yield was 17% in milk and 27% in butterfat, and with Jersey grade X scrub cow, it was 22% in milk and 34% in fats.

Second Generation Grades.—The average increase in production for the second generation Holstein grades as compared with their scrub grand dams was 174% in milk and 130% in fat. In the case of Guernsey grades, 72% in milk and 94% in fat; and for Jersey second grades, 59% in milk and 74% in fats.

In an appended table, the averages for two generations of grades and their scrub ancestors are given.

The results obtained show clearly that the use of purebred sires is a sure way of increasing milk and butterfat production, if bred with a scrub herd, on condition, that the bulls are selected carefully both from the point of view of their heredity and also of their individual capacity.

414.—Rearing Calves on Milk Substitutes.—

DECHAMBRE, in the *Comptes rendus des séances de l'Académie d'Agriculture de France*, Vol. VII, No. 6, pp. 107-122. Paris, February 9, 1921.

The Animal Husbandry Section (*Section d'Economie des Animaux*) of the Academy of Agriculture of France requested the author to read a paper on the means of ensuring the proper feeding of young hand-reared calves without interfering with the milk supply required for human consumption or by the dairy industry. In this communication, the author describes the methods to be recommended, and which are at present in use.

Instead of feeding calves exclusively on milk, great economy can be effected by the use of various substitutes.

Of these the chief is skim-milk, whether fed alone, or with the addition of suitable substances; its use promotes the consumption of farinaceous matters, grain, or similar foods. Whey from the cheese-factories, hay tea and an infusion of barley radicles can also be fed, provided such nutritive and digestible substances are added as give the mixture the nutritive value of whole milk. These liquids also serve to complete a ration containing farinaceous substances, grain, or seeds. Calves are still reared on mashes consisting of various ingredients, and finally, on suitable dry foods that are properly prepared and fed. Among the substitutes usually least known to practical agriculturists are starch, manioc flour, rice flour, linseed, meat meal.

Details of the composition of the rations are given, and the article concludes as follows:

Many preparations can be used as substitutes for milk in feeding hand-reared calves. Whenever skim milk can be obtained, it forms a basis which can easily be completed. Should it be unprocurable, hay tea can be used instead, or else one of the above-given recipes, the choice being determined by economy and the ease with which the ingredients can be obtained. The next point is to remember that absolute cleanliness is indispensable, not only in preparing and distributing the rations, but also in the utensils, mangers, stalls, and litter. Illness in hand-reared calves is frequently due,

either directly or indirectly, to the lack of hygienic precautions.

In the discussion that followed the reading of this paper, H. Sagnier mentioned that he had seen margarine used in Italy on a large scale for feeding calves as a substitute for the fat contained in skim-milk.

Dechambre stated that much skim-milk was used in Italy; margarine and groundnut oil can be added to it, but a special apparatus is needed for making the emulsion.

Calves are reared on hay-tea in Normandy. It can be given alone, but it is better to add flour, ground oats, or linseed meal (30 gm. per litre), or else crushed oats or linseed, which should be fed in a special manger.

415.—Maize Stover Silage Versus Maize Silage for Milk Production.—MORRISON, E. B., HUMPHREY, G. C., and HULCE, R. S., in *Journal of Dairy Science* Vol. IV, No. 1, pp. 29-31. Baltimore, Jan., 1921.

Experiments made at Wisconsin Experimental Station, Madison, with 8 cows, producing an average of 1½ lb. fat daily. They were separated into 2 equal groups, each being fed with two kinds of silage on the double reversal method for 2 periods each of 4 weeks duration with a preliminary week preceding each. The concentrate mixture used consisted of: 4 pts. ground maize + 4 pts. wheat bran + 1 pt. linseed meal + 1 pt. cottonseed meal and alfalfa hay fed at the rate of slightly less than 1 lb. of hay daily to each 100 lb. of cow weight. Each kind of silage was fed *ad libitum* twice daily. Apparently the cows consumed on an average about 5 lbs. less stover silage daily per animal than of maize silage (33.25 lb. to 28.31 lb.).

Results indicated that the average daily milk production on the maize silage ration was about 3 lb. more daily per cow than on stover silage (27.4 to 24.5 lb.). A corresponding relationship existed also in the productions of butterfat (1.05 to 0.98 lb.).

Both lots lost to a certain extent in live weight, but the difference is not great enough to be considered significant.

A comparison between the two silage rations from the financial standpoint, shows that the price at which stover silage could be figured was 61% of the price at which maize silage was valued.

325.—Poultry Keeping in Fruit Plantations.—GARRAD, G. H., in the *Journal of the Ministry of Agriculture*, Vol. XXVII, No. 4, pp. 350-359. London, July, 1920.

The author's object is to show that poultry keeping and fruit growing can be made a very profitable combination. A detailed report is made of the work carried out on 14½ acres of land in the southeast of England on a steep hill facing south. The author himself checked the accounts of the said fruit farm.

The results supported the opinion expressed by Theobald, the Agricultural Entomologist, that the employment of poultry as a means of checking some of the insect pests of fruit is a subject that deserves far more attention than it has hitherto received. As an example of what fowls eat in an orchard, he gives an analysis of the crop and gizzard contents of a White Leghorn chicken of 5 weeks old, namely: 190 pear midge maggots, 127 aphides, 12 red ants, 2 tortrix caterpillars, and 1 beetle in addition to grain seed and other foods. A Red Sussex pullet contained 14 leather jackets, 10 fever flies, 2 wireworms, 4 cutworms, 5 beetles, 50 ants, 7 woodlice, 4 slugs, 1 millipede and 20 larvæ of the winter moth. The light breeds, such as Leghorns, hunt the best and go further afield than the heavy breeds such as Wyandottes and Orpingtons, and in orchards of standard trees they are therefore the most suitable breeds to use for this purpose.

With reference now to the fruit farm in question, the owner does not believe in deep digging because it prevents the fine feeding roots of the trees from working their way close up to the surface of the ground where they can make full use of the poultry manure. Also a shallow tilth is preferred to prevent the winter caterpillars that fall from the trees burying themselves deeply in the soil. The practice of walking through a plantation and shaking each bush is recommended, as the poultry follow and consume each caterpillar as it falls to the ground. Only young chickens are allowed to run among the gooseberry bushes, the hens being confined in coops but hens properly fed will not attack the fruit (nor even currants until they begin to colour), and do a great amount of good by picking off the scale insects. They are also invaluable in dealing with raspberry and loganberry beetle, but do not attack the hairy sawfly caterpillars on gooseberries, and only cuckoos will deal with these. Windfall apples will, of course, be attacked by the birds but this is unavoidable.

No expensive poultry houses or appliances are kept and nearly all are home made. A 100-egg incubator has been used on a few occasions in the past 2 seasons, but with that exception all the eggs have been hatched out under hens. The breeds kept are the White Wyandottes, Buff Orpingtons and White Leghorns; all general utility fowls.

From the balance sheet it is evident that the poultry proved exceedingly profitable.

FARM ENGINEERING

331.—Utilization of Automobile Engines.—RINGELMANN. M., in the *Journal d'Agriculture pratique*, Year LXXXV, Vol. 1, pp. 12-16. Paris, Jan. 6, 1921.

The utilization of old touring-car engines may be of interest to country agricultural

work-shops, repair-shops, and for grinding and crushing grain, in cider factories, for pumping water, etc.

It is preferable to remove the engine from the chassis and bed it on a suitable frame resembling that used as a bed for testing engines in a motor works. The frame may be made of double T irons, or of hard wood, and the engine bed bolted on to it. For certain kinds of work it is best to gear the engine down. This can be done by keying a pinion on to the main shaft geared to a counter shaft such as is used in electric dynamo plants. It is better to have spur gearing which is silent or a green leather pinion. The countershaft, running at, say, 250-300 revolutions per minute, carries a belt pulley.

The fan-cooled radiator should be replaced by a tank placed laterally and high up. But if the water is circulated by a pump, this system should be retained as the hot water discharge pipe is not wide enough to allow a rapid enough flow of cool water if the thermo-siphon is to be used.

The exhaust expansion box should be done away with as it always causes a certain amount of back pressure, and a wide pipe should be substituted, that is sufficiently long to prevent flames issuing that might cause fire. By doing this the author increased the power of an old engine by 10% at the Station d'Essais de Machines, without increasing the fuel consumption. The engine may be set on top of a brick platform about 45 cm. high, so that it is easy to turn the starting handle, or it can be mounted on a platform provided with 4 cast iron rollers, or on a trolley. Light, high speed engines, weighing not more than 20 kg. per H.P. can only be kept steady by weighting the frame with stones, wooden boxes filled with earth, etc.

When the capacity of the engine is known, it is advisable to set up a power plant on one frame, i.e. pump, saw, generator, etc. It is better to use a carburettor which can use paraffin instead of petrol, or better still, a poor gas generator, to reduce the cost of fuel, especially under present conditions.

AGRICULTURAL INDUSTRIES

431.—Changes Taking Place in the Tempering of Wheat.—TAGUE. E. L., in *Journal of Agricultural Research*, Vol. XX, No. 4, pp. 271-275. Washington, D.C., Nov. 15, 1920.

In milling wheat it has been found advisable to temper or condition the grain before grinding. This process consists in adding a certain amount of water to the wheat, then thoroughly mixing and allowing it to stand for a time. The treatment toughens the bran coat of the kernel, thus making possible a separation of the bran and the flour and increases the desirable milling qualities of

the wheat in other ways. The yield of flour is increased and a flour is obtained which permits a better quality bread being made.

Three varieties of wheat were used for the experimental work: (1) Kanred.—hard var. with 12.65% moisture content: (2) Turkey or Kharkof.—hard red var. with 10.86 ditto. (3) Arizona white wheat.—soft var. with 10.8% ditto. The only chemical changes considered in this study were changes in hydrogen-ion concentration, total acidity, water soluble phosphorous and titrable nitrogen.

Different periods of time, temperatures and moisture contents were compared as follows:—(1) Time, 24, 48 and 72 hours; (2) temperature, 5°, 20° and 40° C.; and (3) moisture content, 15½ and 18%.

When the wheat was tempered at 5° C. there was practically no change as compared with the untempered wheat, but as a general rule the yields were slightly higher and the milling qualities were considerably better than those secured from the latter. The length of time appeared to have very little influence on either the physical or chemical composition of the flour.

At 20° C, the hydrogen-ion concentration was increased, the total acidity, water soluble phosphorous, and titrable nitrogen were also higher, and there was a distinct advantage over the results at 5° C. The chemical changes were still more pronounced when the grain was tempered at 40° C. and the physical changes appeared to be detrimental after 48 hours so far as the milling value of the wheat was concerned. In general the milling qualities of the drier wheats were improved by tempering more than those of the wetter wheats, and the hard wheats more than the soft, and a 15½% moisture appears to be about the best.

441.—Preservation of Canvas Sacks Intended for the Reception of Products Used in Agriculture.—LAVERGNE, G., in the *Comptes rendus de l'Académie d'Agriculture de France*, Vol. VIII, No. 1, pp. 29-30. Paris, January 5, 1921.

The author, having had occasion to saturate with carbon dioxide large quantities of natural alkali carbonates extracted from Vichy water, spread them, in order to carry out the process, upon screens covered with more or less fine canvas, and found the fabrics were rapidly destroyed by the corrosive action of the damp carbonates, so that it was necessary constantly to renew the canvas. The idea then struck him to silicate the material; this increased the duration of the canvas tenfold, and effected a considerable reduction in expense.

He therefore suggests that the process might be applied for the purpose of preserving the large coarse canvas sacks used for keeping various substances required in

agriculture (fertilizers, chemical products, etc.) and which wear out very soon.

The experiment is most easily carried out by diluting one litre of silicate of potash or soda with twenty litres of water, immersing the sack in this mixture until it is well impregnated, then wring it out well in order to recover some of the liquid, which can be used again.

559.—Method for the Detection of Abnormal Milks.—BAKER, J. C., and VAN SLYKE, L. L., in *Technical Bulletin* No. 71. New York *Agricultural Experiment Station*, pp. 1-14. Geneva, N.Y., June, 1919.

The method employed was based upon the use of brom-cresol purple as an indicator.

Clark and Lubs were the first to suggest the use of this indicator in connection with milk cultures. They made use of the dye then known as dibrom-ortho-cresol-sulfon phthalein (*Journal of Agricultural Research*, Vol. 10, p. 105, 1917). This dye can be purchased from Hynson, Westcott and Dunning, Baltimore, Md.

One drop of a saturated water solution of this dye is mixed with 3 cc. of milk, and the colour is observed. Normal fresh milk gives a greyish-blue shade. The production of a darker or lighter colour awakens suspicion in regard to the normal character of the milk. The colour is made lighter by acids, acid salts, formaldehyde, and also by heating above the usual point of pasteurization. The colour becomes deeper blue in the case of milk from diseased udders, watered milk, skimmed milk, and milk containing alkali or alkaline salts. In the inspection of milk, a sample is taken for further detailed examination in the laboratory. If the colour is sufficiently lighter or darker than normal it indicates the probability of some abnormal condition.

The method has been applied and 570 samples of market milk examined. Watered milk is thus easily detected, and also milk containing excessive numbers of leucocytes. A standard of colour can be prepared by which comparison can be made and conclusion more easily reached as to the normality or abnormality of samples examined.

PLANT DISEASES

335.—The Phytopathological Services of Uruguay and the International Phytopathological Convention at Rome.—Communicated by Dr. E. J. Rovira, Delegate of Uruguay.

I have the honour of communicating to my esteemed Colleagues of the Permanent Committee, the information that, by the instrumentality of the Ministry of Foreign Affairs, I have received from the Ministry of Commerce of my country. This communication not only shows the interest taken in the Phytopathological Service by the

Government Authorities of Uruguay, but also manifests their entire approval of the work accomplished, and the conclusions reached, by the International Phytopathological Conference held in Rome.

The present constitution of the organization of the Uruguayan Phytopathological Services completely complies with the formalities declared obligatory by the Convention of Rome in the case of all the adhering States. Through the initiative of Uruguay, an International Phytopathological Conference, similar to that held at Rome, met in Montevideo in May, 1913. It approved three Conventions which, taken together, indicate and establish the same measures as those enforced by the Convention of Rome, and lay similar obligations upon the adherent States.

For this reason, the Ministry of Commerce is of opinion, that there is nothing to hinder Uruguay from notifying her adherence to the Rome Convention.

In accordance with Art. 9, of the International Convention of the "Defensa Agrícola" signed at Montevideo, an International Bureau, with headquarters at that town, has been established under the direction of an agricultural expert appointed by the Government of Uruguay. We may therefore conclude that this Bureau will be of great use in establishing international relations with a view to diffusing information respecting the movements of agricultural pests, and the means of their control.

The fact of its existence shows that since the headquarters of this movement is established in South America, Uruguay should recognize its own obligations and those of the other States united together by the bond of a common aim.

In agreement with this view, and in consequence of the conclusions arrived at by the International Phytopathological Conference of Rome, the Ministry of Commerce passed the following resolution on September 3, 1914:—

(1) All plants, or parts of plants, intended for cultivation, as well as flower bulbs and cut flowers sent abroad, shall not leave the country unless they are provided with a certificate stating them to be free from the plant parasites enumerated in the official list of the importing State.

(2) The General Direction of the "Defensa Agrícola" is required to take all the necessary measures for supplying these certificates and obtaining the exporters' declarations in accordance with the stipulations of the International Phytopathological Conference at Rome.

(3) The products mentioned in Art. 1 shall only be exported from ports authorized by the general regulations dealing with the protection of agriculture.

I much regret that this information did not arrive in time to be incorporated in the

interesting report on this subject presented to the last General Assembly by the Hon. Delegate of Sweden, but I hope that it will nevertheless be received with satisfaction by the Permanent Committee.

As regards the definitive adherence of Uruguay to the Convention of Rome, I am awaiting the instruction of my Government.

345.—*Phomopsis Pseudotsugae* Deuteromycete Injurious to *Pseudotsuga Douglasii* in England.—ALCOCK, N. L., in *The Gardener's Chronicle*, Vol. LXIX, No. 1778, p. 45, Jan. 22, 1921.

During the summer and autumn of 1920, plantations of Douglas Fir (*Pseudotsuga Douglasii*) were attacked by *Phomopsis Pseudotsugae* in several English localities; the characteristics associated with the attack were similar to those previously observed in Scotland.

The disease is causing serious loss among the English plantations. In one case in Hampshire in 1919, over 20% of the young leaders are reported to have been killed, which will seriously affect the future shapeliness and value of the trees. In an adjoining plantation with trees of about 8 years old, considerable numbers of stems and branches are affected.

At Bagshot (Surrey) in the nursery at Ripley, the disease has attacked and injured a considerable number of transplants, i.e., 4 year old plants. At Swinley (Berkshire) and in other nurseries, the disease has attacked the leader or the young branches of a considerable number of plants. It has been found at Midhurst (Sussex), and is probably widespread, and is evidently a serious pest as regards young plantations of *P. Douglasii*.

453.—Wart Disease of Potato (*Synchytrium endobioticum*) also Attacks Tomato Plants, in Pennsylvania.—*Weekly News Letter*, Vol. VIII, No. 30, p.3. Washington, Feb. 23, 1921.

Recent investigations made by the United States Department of Agriculture on the control of the potato wart disease (*Synchytrium endobioticum* (Schilb) Perc. = *Chrysophlyctis endobiotica* (Schilb.), a European trouble found in North America in 1918, disclosed the fact that this disease also attacks tomatoes. Out of 28 varieties of tomatoes planted in the wart-infested gardens of the eastern Pennsylvania, 26 were found to be susceptible to the disease.

It is at present known to be confined to gardens in a few mining villages in Pennsylvania, West Virginia and Maryland. The disease attacks only the stems and roots of the plant, causing the formation of small warts; it probably does not reduce the yield of fruit.

The importance of the discovery of the susceptibility of tomatoes to potato wart lies in the fact that affected tomato plants will serve to carry the disease over from year to year in the absence of potatoes, and to introduce it into new localities through the transplanting of tomato seedlings grown in infested soil. It is not yet definitely known whether all varieties of tomato are susceptible to wart disease, but it is feared that such may be the case. Other plants belonging to the Solanaceae are suspected of being susceptible to wart and some have already been tested, but with inconclusive results; the tests will, for this reason, be repeated.

454.—**Onion Smut** (*Urocystis Cepulae*) in England.—*Ministry of Agriculture and Fisheries*, Leaflet No. 365, pp. 1-6. London, February, 1921.

The attacks in England of Onion Smut (*Urocystis Cepulae*) are confined at present to five centres. They occur in strictly localized areas in the following localities: near Northampton, St. Neots and Kendal, and in market gardens in two districts in Northumberland.

A description of the disease, method of infection and means of control are here given.

Leeks are, if anything, even more susceptible to smut than onions, so that the cultivation of this crop, and also of shallots, should be confined to soil free from contamination.

The application of a solution of formaldehyde to the drills at the time of sowing, has, however, proved very effective. The Ministry of Agriculture in London is carrying out trials with this substance in the hope of being able to recommend a simple and satisfactory method of treatment.

Onion smut was scheduled in 1920 under the Destructive Insect and Pests Act. Under the Order no person is allowed to sow onion seed in the locality declared by the Ministry to be an "infected place." Onion plants grown in an infected place may not be removed until the plants have been inspected whilst growing, by an Inspector of the Ministry and certified by him to be free from smut, and have been washed free from soil. Any person in charge of land on which onion smut exists must notify the fact to the Ministry or to an Inspector of the Ministry. If smut is found to exist in any subsequent year, a further notification of disease must be given. Any person failing to comply with the requirements of this order is liable to a penalty not exceeding ten pounds (sterling).

INJURIOUS INSECTS

462.—**Experiments on the Toxic Action of Certain Gases on Insects, Seeds and Fungi.**—NIEFFERT, I. E., and GARRISON, G. L., in *United States Department of Agriculture*, Bulletin No. 893, pp. 1-16. Washington, D.C., 1920.

Report of experiments made to test the action of certain toxic gases and to determine the value of these gases for fumigating purposes. The Bureau of Entomology of the United States in co-operation with the Chemical Warfare Service of the United States War Department made experiments on the action of toxic gases upon the body louse (*Pediculus corporis*) DeG. Nearly 800 fumigations, in which 20,000 insects of about 15 different species were treated, took place. The results obtained as shown in appended tables, lead to the following conclusions:—

Phosgene (COCl_2) is not useful as an insecticide because of the toxicity towards human beings, its high vapour pressure, the difficulty of controlling it, and its comparatively low toxicity towards insects; neither does it possess any value as a fungicide.

Arsine (AsH_3) has no advantage other than the ease of generation and possesses many disadvantages as an insecticide. Its toxicity towards insects is comparatively low, it is injurious to plants, and has no effect on fungi.

Illuminating gas in concentrations up to 3%, and for exposures up to 2 hours is not toxic to insects. Carbon monoxide in concentration up to 3%, and for exposures of 2 hours is also not toxic.

Of the gases tested, cyanogen chloride and chloropicrin give promise of being useful for fumigation purposes. Neither of these, however, can be used in greenhouse fumigation, because of their injurious action on plants. Nevertheless they probably can be used in the fumigation of stored products.

The efficiency of chloropicrin as an insecticide is undoubted, and in general it is more poisonous to stored product insects than hydrocyanic acid. Other advantages which it possesses are ease of detection, and non-inflammability; its disadvantages are its adherent quality, which makes it necessary to air the material for some time after it has been fumigated, its corrosive action on metals, its severe lachrymal effect, and its low volatility. This last objection may be partially overcome by pouring the dose required on paper, thereby increasing the evaporating surface.

As an insecticide, the effect of cyanogen chloride is practically the same as that of hydrocyanic acid. Its disadvantages are its injurious effect on plant life, low boiling

point, slightly corrosive action on metal and severe lachrymal effect; its advantages are that it is active as a fumigant, is easily detected, is not injurious to seeds in doses which are toxic to insects and fungi, and is no more toxic towards human beings than hydrocyanic acid. It is safer to use than the latter because it can be detected in lower concentrations.

More experiments on the fungicidal aspect are necessary to work out in greater detail the methods of its use. Since it is a dry gas and does not injure the seeds, its use would offer a decided advantage over the present method of treatment for fungi, whereby the seeds are moistened, which sometimes causes germination before it is desired.

OTHER ARTICLES ON SCIENCE AND PRACTICE OF AGRICULTURE

On account of lack of space the following articles in the International Review of the Science and Practice of Agriculture can only be referred to. Anyone desiring the articles may obtain them from the Institute Branch, Department of Agriculture, Ottawa.

- 247.—Evidence of Climatic Effects in the Annual Rings of Trees.—DOUGLASS, A.E., in *Ecology*, Vol. 1, No. 1, pp. 24-32, Brooklyn, N.Y., Jan., 1920.
- 277.—Crosses Between Cultivated Strawberry Varieties and Wild Varieties in Alaska to Obtain Hardy Commercial Berries.—GEORGESON, C. C., and BENSON, C. H., in *Report of the Alaska Agricultural Experiment Stations*, 1918, pp. 22-23. Washington, August, 1920.
- 255.—Electroculture.—I. MACCRECY, R.D.; The Theory of Electroculture, *Scientific American*, Vol. CXX, No. 20, p. 530, New York, 1919.—II. Electroculture at Chester. *The Electrical Times*, Vol. LV, p. 205, London, 1919.—III. BLACKBURN, A. E., Electrochemical Treatment of Seed Grain, *The Electrical Review*, Vol. LXXXV, pp. 377-379.
- 258.—A Survey of the Fertilizer Industry.—GOLDENWEISER, E. A., in *United States Department of Agriculture, Bulletin* No. 798, pp. 1-29. Bibliography of Government Publications. Washington, D.C., October 20, 1919.
- 266.—The Assimilation of Carbon Dioxide by Green Plants.—MAZE, P., in I. *Comptes rendus de l'Academie des Sciences*, Vol. CLXXI, No. 26, pp. 1391-1393. Paris, Dec. 27, 1920.—II. *Ibid.*, Vol. CLXXII, No. 3, pp. 173-175. Jan. 17, 1921.
- 279.—Red Clover Seed Situation in the United States.—*The Market Reporter*, Vol. 1, No. 7, pp. 97, 102-104, 107. Washington, D.C., Feb. 14, 1920.
- 283.—The "Cignarellone" Wheat of Molise, Italy.—IOSA, G., in *L'Italia agricola* Year LVIII, No. 1, pp. 1-7. Piacenza, January 15, 1921.
- 322.—Influence of the Time of Calving Upon the Annual Milk Production of Cows.—SCHMIEDER, in the *Deutsche Landwirtschaftliche Tierzucht*, Year XXV, No. 5, p. 46. Hanover, January, 1921.
- 328.—Results Given by Tractors in Belgium.—LEPLAE, E., in the *Journal de la Societe nationale des Agriculteurs de Belgique*, Year III, No. 7, pp. 49-53. Brussels, Feb. 12, 1921.
- 333.—Cost of Threshing in France.—RINGELMANN, M., in *Journal d'Agriculture Pratique*, Year LXXXIV, Vol. II, No. 46, pp. 389-391. Paris, Nov. 11, 1920.
- 338.—Resistance of Different Varieties of Cabbage to Fusarium Conglutinans Wollenw. in the United States.—JONES, L. R., WALKER, J. C., and TISDALE, W. B., in *Agricultural Experiment Station of the University of Wisconsin Research Bulletin*, No. 48, pp. 3-34. Madison, November, 1920.
- 340.—The Part Played by Copper in Anticryptogamic Mixtures.—VILLEDEU, VIVALA SAGNIER, H. and GERVAIS, P., in the *Comptes rendus des Seances de l'Academie d'Agriculture de France*, Vol. VI, No. 31 (Oct. 27, 1920), pp. 762-768 and 754-756. Paris, 1920.
- 364.—The Effect of Frost Upon Roots, and the Best Means of Minimizing Injury Thus Caused.—JENSEN, M., in *The Ugeskrift for Landmaend*, Year 65, No. 51, pp. 701-703. Copenhagen, December, 1920.
- 369.—Field Experiments With Nitrogenous Fertilizers.—I. LIPMAN, J. C., and BLAIR, A. W., Field Experiments on the Availability of Nitrogenous Fertilizers, 1908-1917, in *Soil Science*, Vol. IX, No. 5, pp. 371-392. Baltimore, Md., May 1920.—II. THORNE, C. E., Carriers of Nitrogen in Fertilizers, *Ibid.*, Vol. IX, No. 6, pp. 487-494, June, 1920.
- 370.—Contribution to the Study of the Fertilising Action of Sulphur.—NICOLAS,

THE AGRICULTURAL GAZETTE OF CANADA

- G., in the *Comptes rendus de l'Académie des Sciences*, Vol. CLXXII. No. 1, pp. 85-86. Paris, Jan. 3, 1921.
- 372.—Composition of Tuber, Skins and Sprouts of Three Varieties of Potatoes.—COOK, F. C., in *Journal of Agricultural Research*, Vol. XX, No. 8, pp. 623-635, bibliography of 13 works. Washington, D.C., Jan. 15, 1921.
- 424.—The Economic Advantages of Mechanical Ploughing.—SCHWANECKE, H., in the *Mitteilungen der Deutschen Landwirtschafts-Gesellschaft*, Year 36, No. 6, pp. 90-97. Berlin, Feb. 5, 1921, etc.
- 440.—The Latest Results of the Enquiry Into the Spontaneous Combustion of Hay.—LAUPPER, C. in the *Landwirtschaftliches Jahrbuch der Schweiz*, Year 34, pp. 1-54. Bibliography of 65 works. Lucerne, 1920.
- 446.—The Influence of Soil Factors in Disease Resistance.—HOWARD, A., (Imperial Economic Botanist, Pusa, India), in the *Annals of Applied Biology*, Vol. VII, No. 4, pp. 373-389. London, Feb. 1921.
- 469.—The Influence of Diet on the Antiscorbutic Potency of Milk.—I. HART, E. B., STEENBOCK, H., and ELLIS, N. R., in *The Journal of Biological Chemistry*, Vol. XLII, No. 3, pp. 383-396, Baltimore, Md., July, 1920.—II. HESS, A. F., UNGER, L., and SUPPLEE, G. C., *Ibid.*, Vol. XLV, No. 1, pp. 229-235. December, 1920.
- 474.—The Reversion of Superphosphate.—NEUMANN, B., and KLEYLEIN, K., in the *Zeitschrift für angewandte Chemie*, Year 34, No. 18, pp. 77-80, and No. 19, pp. 84-86. Leipzig, March, 1921.
- 480.—Studies on the Factors and Circumstances Determining the Success or Failure of Crosses Between Wheat and Rye.—FIRBAS, H., in the *Zeitschrift für Pflanzenzüchtung*. Vol. VII, Part 4, pp. 249-252. Berlin, November, 1920.
- 493.—The Production of Alfalfa Seed in New South Wales.—WHITTET, J. N., in *The Agricultural Gazette of New South Wales*, Vol. XXXII, Pt. 2, pp. 105-112. Sydney, Feb. 1921.
- 529.—The Analysis of the Effects of Consanguinity in the Performance of the Pure-Bred Horse.—HUFF, F., in the *Fühlings Landwirtschaftliche Zeitung*, Year LXX, No. 3-4, pp. 47-61. Stuttgart, February, 1921.
- 543.—French Fish-Meal as a Pig Food.—VELU, in *La Vie Agricole et Rurale*, Year X, Vol. XVIII, No. 10, pp. 153-154. Paris, March, 1921.
- 544.—Feeding Tests With Pigs, Using "Pig Meal" and "Pig Compo," in Australia.—PERKINS, A. J., in *The Journal of the Department of Agriculture of South Australia*, Vol. XXIV, No. 6, pp. 471-475. Adelaide, Jan. 1921.
- 550.—The Cost of Threshing in France.—DE MONTARD, G., in the *Journal d'Agriculture pratique*, Year LXXXV, No. 2, pp. 29-30. Paris, January 13, 1921.
- 554.—Methods of Fixing the Price of Milk.—I. MERTZ, I., and DESMOULINS, I., in their Study entitled *Le Payement du lait à la matière grasse*, pp. 1-90. Librairie Agricole de la Maison rustique, 26 Rue Jacob. Paris, 1920.—II. MURRAY, A. H., in the *Agricultural Gazette*, Vol. XCI, No. 2408, pp. 201-202. London, February, 1920.—III. PORCHER, C. and VITOUX, H., in *La Vie Agricole et Rurale*, Year X, Vol. XVIII, No. 7, pp. 99-101. Paris, February, 1921.—IV. RAUCH, in the *Deutsche Landwirtschaftliche Tierzucht*, Year XXIV, No. 49, p. 510. Hanover, December 3, 1920.

THE INTERNATIONAL REVIEW OF AGRICULTURAL ECONOMICS

The following is a brief indication of the contents of the more important articles in the November and December numbers of the Institute Economic Bulletin. Persons interested in any of the articles may obtain the original Bulletin on application to the Institute Branch, Department of Agriculture, as long as the supply for distribution is not exhausted.

November

The Development of Co-operation in Japan. 12 pages. The final installment of a comprehensive article on the subject. It deals with co-operative credit societies, co-operative societies for the sale of produce, co-operative purchase societies, co-operative productive societies, agricultural storage, federations, and the central union of co-operative societies. The author concludes as follows:

"The Co-operative societies of Japan are organized in conformity with special provisions of the law, intended to bring into prominence the special characteristics which co-operative societies ought to have. These are:

1. Limitation of the amount which each member may invest in the co-operative society.

2. Perfect equality among the members irrespective of the number of shares held by them.

3. Limitation of dividends.

These conditions are made compulsory to prevent the society from assuming a speculative character, and to bring into greater prominence the principle of mutuality.

The result of these precautions has hitherto been satisfactory, because at present it seems that no society has assumed a capitalist character, but all are making healthy and natural progress.

Furthermore, considering that only a short time has passed since the law on co-operation came into force, and also that Japanese society in general is not quite prepared to receive new ideas with favour, the present results are very encouraging.

The importance of the work done seems, however, to offer a guarantee that the continual and tenacious efforts of the Japanese Government will successfully conduct the system of co-operation to its full realization.

The foregoing study, based as it is on statistics and precise information, shows, moreover, the increasing diffusion of co-operative societies throughout the Empire, and the importance of their influence on the markets and on the economic life of the country; it also indicates the fact that the enormous development of all the economic,

industrial and commercial activities of Japan, promoted by the world war, is reflected to a considerable extent in the co-operative movement, showing its full maturity and the possibility of an eventual extensive development, such as the altered condition of the prosperity of the country requires.

The great want of Japanese co-operation is a special institution of credit such as exists in other countries. This want is so strongly felt by Japanese co-operators that an active effort is being made for the creation of a central credit institution for co-operation. Many demands and proposals have been put forward by various co-operative congresses, and it seems that the Japanese government is taking the question into serious consideration."

The Steps Taken During the War to Replace Mobilized Farmers and Farm Workers.—9 pages. The second and concluding installment of an article begun in the October number. This installment deals with the institutions engaged in recruiting and distributing agricultural labour, including the National Agricultural Labour Office, and the Departmental Agricultural Labour Committees.

The Repatriation of Australian Soldiers.—7 pages. Gives the early history of the repatriation movement in Australia, describes the Department of Repatriation, and gives the definitions of "discharged and returned soldiers" in the different States of the Commonwealth. The article is continued in the December number.

Measures Adopted for the Encouragement of Agriculture in Austria During the War.—17 pages. The first installment of an article by Dr. Hermann Kalbrunner. Deals with the condition of agriculture before the war, and the measures adopted during the war, including the measures for intensifying production, for protection against plant diseases and vermin, for maintaining the supply of fertilizers, measures relating to labour, to draught animals, to the production and distribution of agricultural machines, and measures for encouraging market gardening and fruit growing.

Other articles in the November number are: The Co-operative Sale of Grain in Bulgaria; The National Confederation of Agricultural Associations in France; The Bill for Insurance Against Accidents in Agricultural Labour in Holland; Mutual Live Stock Insurance in Italy; The Agricultural Credit Provided by the Bank of Naples and the Bank of Sicily.

THE AGRICULTURAL GAZETTE OF CANADA

December

The Measures Adopted in France since 1914 to Encourage Agricultural Co-operation.—12 pages. Describes the support which public authorities have given since 1914 to the mutual agricultural credit banks. Deals first with the normal activity of these banks, bearing upon transactions effected in virtue of laws previous to the war, then describes how under pressure of circumstances they have been obliged to extend their spheres of action. An account is given of the Law of August 5, 1920, which unified and adapted to new requirements the previous laws on agricultural credit. The question of subsidies to associations for the encouragement of motor cultivation is also dealt with.

The Teaching of Co-operation and of Mutual Insurance in Italy.—7 pages. For some time past the teaching of co-operation and of agricultural mutual insurance has been more and more organized in Italy, by certain bodies which have recognized the desirability of forming, by means of courses of technical and practical instruction, individuals capable of carrying on propaganda and of directing the co-operative movement, which is becoming of great importance to the country. The work done in different educational institutions for instructing teachers in co-operation is described in the article. An account is given of the proposed plan to appoint itinerant instructors in co-operation. The work of these instructors would be: (a) to carry on an active propaganda for the promotion of provident institutions in their various forms (mutual insurance, co-operation, saving, insurance); (b) to explain the rules for the formation and successful working

of such institutions; (c) to facilitate them in starting work and in their practical working, providing also for necessary supervision; (d) to calculate in advance the charges falling upon the societies and the corresponding receipts; (e) to popularize the hygiene of labour, and social legislation in general.

The means of giving effect to this programme were: oral propaganda, publications judiciously distributed, special lessons to candidates for the post of masters in elementary schools, and of communal secretaries, prize competitions, and other forms of encouragement for the best institutions.

The Repatriation of Australian Soldiers.—10 pages. The second and last installment of this article. Deals in detail with soldier settlement in each of the States of the Commonwealth.

The Measures Adopted for the Encouragement of Agriculture in Austria During the War.—11 pages. This concluding installment deals with the measures relating to vine growing, cultivating of sugar beets, potatoes, seeds, etc., the supply of cereals and meats, feeding stuffs, stockbreeding, the milk industry, finance, etc.

Other articles in the December number are: The Co-operative Movement in Finland in 1919; The German Co-operative Congress; The Italian National Credit Institute for Co-operation and its Work in 1920; Co-operative Dairies in Sweden in 1919; Agricultural Mutual Insurance Societies in France in 1920; The Bankers' Live Stock Loan Corporation in the United States; New Types of Agricultural Loan Made by the Mortgage Bank of Uruguay for the Encouragement of Colonization; Agrarian Reform in Czecho-Slovakia.

AGRICULTURAL STATISTICS

AREAS SOWN TO WINTER CEREALS

Countries	Wheat			Rye		
	1921-22	1920-21	Average 1915-16 to 1919-20	1921-22	1920-21	Average 1915-16 to 1919-20
	Acres	Acres	Acres	Acres	Acres	Acres
Belgium.....	337,000	306,000	271,000	543,000	559,000	441,000
Bulgaria.....	1,819,000	2,127,000	2,018,000	401,000	433,000	383,000
Spain.....	9,922,000	10,230,000	10,270,000	1,737,000	1,810,000	1,815,000
Finland.....	20,000	20,000	19,000	613,000	606,000	591,000
France (including Alsace-Lorraine).....	11,860,000	12,670,000	11,074,000	2,056,000	2,161,000	2,021,000
Poland.....	2,434,000	2,000,000		10,940,000	8,837,000	
Roumania.....	3,950,000	4,750,000		404,000	656,000	
Czecho-Slovakia.....	1,407,000	1,410,000	1,410,000	2,114,000	2,131,000	2,184,000
Canada.....	842,000	792,000	857,000			
United States.....	44,293,000	44,847,000	41,747,000	5,184,000	4,228,000	5,322,000
India.....	28,012,000	25,722,000	30,499,000			
Algeria.....	1,383,000	1,383,000				
Tunis.....	1,285,000	1,500,000	1,457,000			
Countries Totals.....	107,564,000	107,757,000		23,992,000	21,421,000	

FOREIGN CROP PROSPECTS

(Based on information received up to April 24th)

United Kingdom.—Wheat has wintered well in the United Kingdom and the condition of winter wheat is up to the average. Cold, unsettled weather was experienced during the last part of March, and spring sowing was considerably delayed.

France.—Stormy weather delayed spring field work, and was unfavourable for growth. The French official report for March indicated that the condition of the wheat crop was slightly inferior to that of the same period last year. The winter wheat area is 11,860,000 acres against 12,670,000 last year.

Belgium.—The winter crops are reported to be in good condition, although some re-sowing will be necessary.

Italy.—Conditions are favourable for the winter wheat crop. Spring sowing is proceeding actively.

Sweden.—The wheat fields have been generally well protected by snow during the winter.

Spain.—Crop conditions were satisfactory early in April.

Germany.—Cold, frosty weather prevailed during the latter part of March, and considerable damage was done to the crops.

Roumania.—The latest official crop report gives the winter wheat area as 3,950,000 acres, compared with 4,750,000 last year. Spring weather was very favourable and the soil in good condition. Efforts were being made to increase the spring wheat acreage.

Jugo-Slavia.—Winter wheat has a good appearance and is very forward in growth. Spring ploughing was well advanced.

North Africa.—Growing conditions are reported to be favourable in Tunis and Algeria and a fair crop is expected. Drought is causing apprehension in southern Tunis. The condition of the wheat crop in Egypt is average.

Argentina.—The threshing of the wheat crop is practically completed. No recent estimates of production have been made but the present outlook indicates that the official estimate of 154,833,000 bushels will be exceeded. The quality of the grain is generally good. Fine weather continues to favour the corn crop.

Australia.—The preliminary estimate of the wheat crop harvested last December-January is 134,184,000 bushels against 144,400,000 last year. The revised estimates are expected to show some decrease but the quality of the grain is reported to be very good. Dry weather prevailed during the latter part of March.

New Zealand.—The total yield of wheat for 1921-22 is estimated at 10,500,000 bushels against 6,872,000 last year.

India.—The area sown to wheat for the crop just harvested is officially estimated at 28,012,000 acres compared with 25,722,000 last year. The five year average was 30,499,000 acres. The crop was harvested in good condition and under favourable circumstances.

China.—The new wheat crop of China will not be a large one. Some estimates place it as smaller than last year's small yield. It is expected that it will be necessary to import a considerable quantity of foreign wheat.

UNITED STATES APRIL CROP REPORT

Forecast of a production of 572,974,000 bushels of winter wheat, almost an average crop, was made as of April 1 by the Crop Reporting Board of the U.S. Department of Agriculture. Compared with this forecast is the estimated crop of 587,032,000 bushels in 1921, of 610,597,000 bushels in 1920, and the average of 578,575,000 bushels for the preceding 5 years.

The April forecast is based on the assumption of average abandonment on account of winterkilling of the area sown to winter wheat last fall, and average influences on the crop to time of harvest.

The acreage of the winter wheat crop of this year was estimated for last December 1 to be 44,293,000 acres subject to reduction by winterkilling and subject to revision up

or down for other reasons. This acreage is 98.8 per cent of the winter wheat acreage of the preceding year.

A rye production of 69,667,000 bushels is indicated by the condition for April 1. This is above the production of 57,918,000 bushels in 1921 and of 60,490,000 in 1920. The average production of the preceding 5 years was 66,474,000 bushels.

Rye came through the winter better than the average, and its condition of 89 per cent of a normal on April 1 compares with a 10-year average of 88.5 per cent. In the States that are prominent in rye production the condition of the crop is above the average, except in Michigan, where it is the same as the average.

THE AGRICULTURAL GAZETTE OF CANADA

UNITED STATES WEEKLY WEATHER CROP BULLETIN, APRIL 19th

The weather was favourable for growth of vegetation in the Southern and Eastern States, where it advanced rapidly. The week was unusually cold and stormy in the Western States, and unfavourable for field work, growth of vegetation and for stock. Considerable frost damage occurred to fruit in California and the central and lower Rocky Mountain States. Field work made satisfactory progress in the South, but little was possible in central districts on account of saturated soil, and spring grain planting

was seriously delayed in many localities. Continued excessive moisture is showing bad effects on winter wheat in some central and eastern portions of the belt, where there are complaints of yellowing on poorly drained soil. Progress of the crop in Oklahoma and Eastern Kansas was very good, but in north central and western Kansas the fields are weedy and stooling poorly. Preparation of corn land is badly delayed in central districts, while spring wheat seeding is progressing slowly and is behind the average.

EUROPEAN WHEAT REQUIREMENTS

(From Daily Trade Bulletin, Chicago, Apr. 18, 1922)

European wheat requirements until next harvest suggest the necessity of continued liberal buying. Reports yesterday said Greece will need 1,295,000 bushels monthly; Finland needs 800,000 bushels rye; the Baltic States in general are dependent largely upon American flour. Belgium is subsisting from hand to mouth on foreign grain purchases until the next crop. France requires 18,500,000 to 22,200,000 bushels of wheat. Roumania has suspended shipments of grain due France and Switzerland under

contract. Italy has suspended the import duty on grain until June 30 and stocks of wheat in that country are estimated at 33,300,000 bushels, which are said to have deteriorated and are being distributed at \$4.75 per quintal of 220 lbs., a price considerably below Argentine and American wheat, thus destroying the free market. Unless distribution of government stocks is suspended by reversal of the state policy the Italian wheat requirements during the next six months will be small.

LIVE STOCK STATISTICS

THE AUSTRIAN REPUBLIC

Classification	April, 1920	Dec. 1910	Increase(+)or decrease(-)	
			in number	per cent
Cattle.....	2,113,692	2,175,342	- 61,650	- 2.8
Swine.....	1,189,434	1,790,995	-601,561	-33.6
Sheep.....	368,361	278,482	+ 89,879	+32.3

Classification	1920	1918	Increase(+) or decrease(-)	
			in number	per cent
Horses.....	200,802	185,768	+ 15,034	+ 8.1
Asses and mules.....	364,237	354,679	+ 9,558	+ 2.7
Cattle.....	659,398	649,229	+ 10,169	+ 1.6
Sheep.....	5,811,418	5,467,828	+343,590	+ 6.3
Goats.....	3,418,002	3,472,749	- 54,747	- 1.6
Swine.....	416,221	365,074	+ 51,147	+14.0
Poultry.....	5,073,479	4,452,782	+620,697	+13.9
Rabbits.....	460,661	337,370	+123,291	+36.5

Classification	1920	1919	Increase(+)or decrease(-)	
			in number	per cent
Horses.....	164,502	164,980	- 478	- 0.3
Cattle.....	442,668	406,569	+ 36,099	+ 8.9
Sheep.....	530,291	419,909	+110,382	+26.3
Swine.....	260,693	150,072	+110,620	+73.7

AN INVESTMENT	that Increases in Value the longer it is Held.
AN INVESTMENT	you can Realize upon immediately, without loss.
AN INVESTMENT	that will yield $5\frac{1}{2}\%$ Interest, compounded half-yearly.
AN INVESTMENT	that is backed by All the Resources of Canada.

is offered you in

Dominion of Canada Savings Certificates

Denominations to suit every Investor

<u>\$5</u>	<u>\$10</u>	<u>\$25</u>	<u>\$50</u>	<u>\$100</u>
-------------------	--------------------	--------------------	--------------------	---------------------

Obtainable at the following Prices:

\$4.25 \$8.50 \$21.25 \$42.50 \$85.00

at any Bank or Money Order Post Office

"INVEST TO-DAY!" "SAVE BEFORE YOU SPEND!"

Issued by The Finance Department, Ottawa

**DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
PUBLICATIONS BRANCH**

Vol. 9: No. 4

July-August, 1922

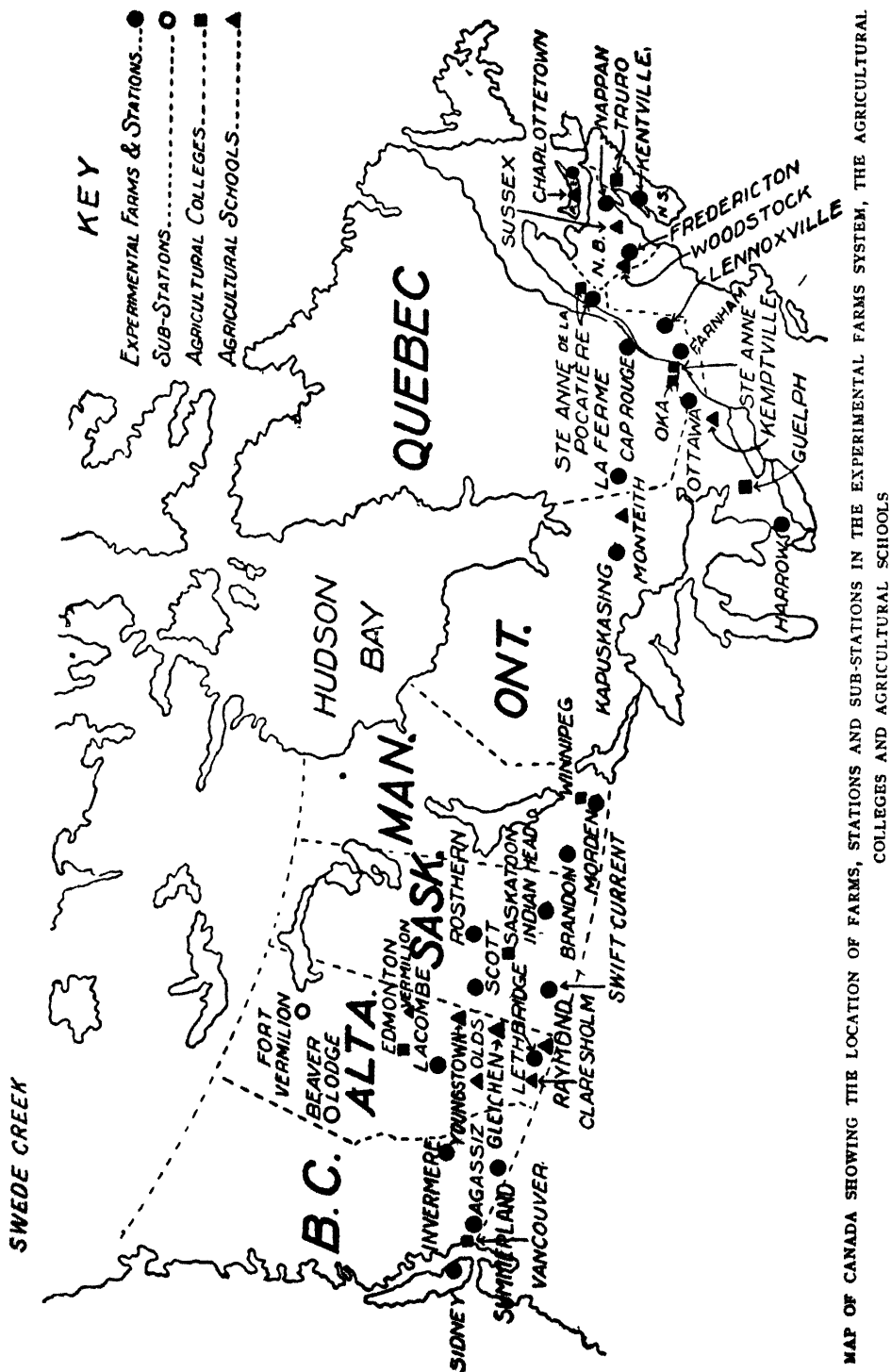
**The AGRICULTURAL GAZETTE
OF CANADA**

J. B. SPENCER, Director of Publicity

Wm. B. VARLEY, Editor

**Issued by authority of the Honourable W. R. Motherwell, Minister of Agriculture
OTTAWA**

**OTTAWA
F. A. ACLAND
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1922**



MAP OF CANADA SHOWING THE LOCATION OF FARMS, STATIONS AND SUB-STATIONS IN THE EXPERIMENTAL FARMS SYSTEM, THE AGRICULTURAL COLLEGES AND AGRICULTURAL SCHOOLS

CONTENTS

PART I.

DOMINION DEPARTMENT OF AGRICULTURE

PAGE

THE DOMINION EXPERIMENTAL FARM SERIES,—THE BRANDON EXPERIMENTAL FARM, <i>by W. C. McKillican</i>	275
REPORT OF COW TESTING, 1921, <i>by A. H. White</i>	279
ILLUSTRATION COMMUNITY WORK IN DUNDAS COUNTY, ONTARIO, <i>by F. C. Nunnick, B.S.A.</i>	283
THE APPLICATION OF SEED LEGISLATION IN CANADA, <i>by C. Sweet</i>	295
SEED PRODUCTION IN ALBERTA, <i>by G. M. Stewart</i>	298

PART II.

PROVINCIAL DEPARTMENT OF AGRICULTURE

NEW BRUNSWICK'S ACTIVITIES UNDER THE AGRICULTURAL INSTRUCTION ACT, <i>by O. C. Hicks, B.S.A.</i>	301
THE MANITOBA AGRICULTURAL SURVEY.....	305
AGRICULTURAL LEGISLATION, 1922—NEW BRUNSWICK, SASKATCHEWAN, ALBERTA, MANITOBA.....	307
THREE MONTH COURSES IN AGRICULTURE AND DOMESTIC SCIENCE.....	314

PART III.

AGRICULTURAL EDUCATION AND RELATED ACTIVITIES

RURAL LIFE AND ACTIVITIES FOR WOMEN, <i>by Miss Abbie Delury</i>	315
SCHOOL GARDENS AND HOME GARDENS, <i>by G. V. Van Tausk, M.A., B.Sc. (Oxon) B.S.A.</i>	318
THE SCHOOL GARDEN, WHERE? <i>by Fred W. Bates, B.A., M.Sc.</i>	320

PART IV.

SPECIAL CONTRIBUTIONS, REPORTS OF AGRICULTURAL ORGANIZATIONS, PUBLICATIONS AND NOTES

RURAL CREDITS IN CANADA.....	321
PROTECT THE BIRDS, <i>by L. Stevenson, B.S.A.</i>	324
BEEES MAY NO LONGER BE IMPORTED FROM EUROPE.....	326
EXPORT FEE FOR FOXES.....	326
NEWS ITEMS AND NOTES.....	326
APPOINTMENTS AND STAFF CHANGES.....	331
NEW PUBLICATIONS.....	332
ASSOCIATIONS AND SOCIETIES.....	333
THE LIBRARY.....	334

PART V.

THE INTERNATIONAL INSTITUTE OF AGRICULTURE

FOREIGN AGRICULTURAL INTELLIGENCE—	
Science and Practice of Agriculture.....	337
General Information.....	337
Crops and Cultivation.....	337
Live Stock and Breeding.....	341
Farm Engineering.....	344
Rural Economics.....	346
Agricultural Industries.....	347
Plant Diseases.....	348
Other Articles on Science and Practice of Agriculture.....	350
THE INTERNATIONAL REVIEW OF AGRICULTURAL ECONOMICS.....	352
AGRICULTURAL STATISTICS.....	353

The AGRICULTURAL GAZETTE

OF CANADA

VOL. IX

JULY-AUGUST, 1922

No. 4

DOMINION EXPERIMENTAL FARM SERIES

THE BRANDON EXPERIMENTAL FARM

BY W. C. McKILLCAN, SUPERINTENDENT

THE Experimental Farm for Manitoba was established at Brandon in the year 1888. It is therefore one of the pioneer farms of the Dominion Experimental Farm system. The first Superintendent was Mr. (now Dr. S. A. Bedford, who for many years carried on a work of inestimable value to the province. In the first years of the Farm's history its activities were directed toward solving the problems of the pioneer stage of agriculture. Tests were made of almost innumerable varieties of grain, many of which were brought from distant countries. Trees and flowering shrubs were brought from countries having a severe climate in order to provide the prairie with hardy material. The caragana is an example of one of the most important plant importations. Pioneer work was accomplished in regard to ascertaining the best methods of handling the prairie soil in order to get satisfactory returns, while work with fodder crops, vegetables and live stock began early in the history of the Farm to take an important place.

As conditions have changed with ageing and development of the country, so the work on the Experimental Farm has been modified and enlarged. Manitoba to-day is in a transition stage. The system of grain growing which proved so successful in the early stages of her agricultural history is breaking down. The constant drain upon the soil, and the continual pulverization due to cultivation with no return of fertility or vegetable fibre, has rendered imperative the need of a changed system. Soil drifting, lessened yields, weeds, insects, and plant diseases have all appeared as symptoms of the soil disease that follows the one-crop system. The chief object of the Brandon Experimental Farm at the present time is to provide the information and leadership that will enable the farmer to pass this trying period of change and to bring into existence in Manitoba a system of diversified farming which will put agriculture on a new plane of permanence and prosperity.

Crop Rotation Experiments

One of the features of the work of this Farm that bears most directly on this problem, is the experiment with crop rotations. This experiment makes a direct comparison between the grain growing system and various arrangements of crop sequence into which fodder crops are introduced. The comparisons are conducted on field areas as distinct from small plots, so that natural farm conditions are obtained. The areas used also permit of cost and return records. All items of cost in the production of crops on these rotation fields are accurately kept, and all crop returns are equally as carefully recorded and their values computed as fairly as possible. These records give definite profit-and-loss comparisons of the rotations under test. Data are also being established in regard to the effect

on the land of these rotations. Check plots representing the rotations were started on virgin soil, which soil was analyzed at the beginning of the experiment in 1911, and the analysis will be repeated from time to time to determine the effect the rotation has on its fertility. The rotations under test include straight grain growing with a summer fallow once in four years; the same sequence of crops with the application of barnyard manure; the addition of a mixed grass and clover hay crop to the grain system; the substitution of corn for fallow; the use of alfalfa

farm crops. These are reported on from year to year and give authentic figures on the cost of the different crops produced in different ways.

Experiments with Fodder Crops

The experimental work with fodder crops is another important contribution to the solving of Manitoba's agricultural problem. Any mixed farming system likely to be a success includes something of this kind. Experiments have been carried on to determine what crops are best suited to the climate and how best



The breeding of Clydesdale horses is one of the features of the Brandon Experimental Farm.

as a main feature of a rotation, and different arrangements of the order of the crops concerned. Important results have already been obtained from this experiment, indicating that greater profit can be made from a mixed farming system aside altogether from the lasting effect on the soil, and showing the great value in rotations of such crops as corn, alfalfa and grasses.

As a by-product from the rotation experiment come very valuable data on the cost of production of the various

to grow them. Great success with alfalfa has been attained at Brandon. Trials with different strains and varieties have been made to ascertain which are hardiest and most productive, and many tests are being conducted to determine the best methods to follow in preparing the land and growing the crop. Similar work is being carried on with sweet clover, and to a lesser extent with Western rye grass. Cultural experiments with corn have been conducted for a number of years and are

THE AGRICULTURAL GAZETTE OF CANADA

now being undertaken with sunflowers. Tests of varieties of each are included.

Variety Tests

While forage crops are getting special attention at the present time owing to their peculiar importance and the general demand for information from beginners with this type of crop, the cereal crops are by no means being neglected. The Brandon Farm has always been one of the principal testing-out stations for the new varieties originated by Dr. C. E. Saunders, the Dominion Cerealists. There are always

Live Stock

One of the outstanding developments of the Brandon Farm has been the growth of the work with live stock. This is of course in keeping with the general policy of the development of mixed farming. The work in the breeding of dual-purpose Shorthorn cattle has brought the Farm some prominence in live stock circles. The small herd established at Ottawa was transferred to Brandon in 1911, and has since been developed by the use of good sires and by the selection of the females. The herd has now become one of the best of its kind in Canada in



Brandon Experimental Farm.—Plantation of small fruits sheltered by hedges of Caragana.

a number of these on trial, as well as of any promising or "boomed" new kinds from other sources. An effort is made to furnish the farmers of Manitoba at as early a date as possible with reliable information as to how any new kind of grain compares with the standard sorts in general use. Cultural experiments dealing with methods of wheat growing and the production of other cereals occupy a very important place in the farm work and fill a large part of the annual report.

uniformity of type and in good beef quality combined with a reasonably good ability to produce milk. Two cows with records of over 12,000 pounds in a year have been raised, and many of the others have records ranging from 7,000 to 11,000 pounds in a year.

Breeding work with Oxford Down sheep, Yorkshire swine and Clydesdale horses also occupies an important place in the Farm operations, and a good representative group of each is maintained.

Feeding Experiments

Experimental feeding work has occupied a very important place in the work of the Farm. Perhaps the outstanding effort has been the work in winter steer feeding. Ever since 1892 this phase of experimentation has been kept to the front. In 1907, Mr. Jas. Murray, then Superintendent, began the experiment in outdoor steer feeding which proved the possibility of successfully feeding cattle without warm stables in this climate. This has been of great value

been made, the experiment in regard to hogs being considered especially valuable.

Poultry Department

During the last few years a strong poultry department has been developed. The White Wyandotte and Barred Plymouth Rock breeds of fowl are kept. The breeding work is conducted for the purpose of developing utility strains, which will lay such numbers of eggs and be of such a type of conformation as to



Driveway planting.—Trees and flowering shrubs suited to the Manitoba climate are grown in great variety at the Brandon Experimental Farm.

in starting winter steer feeding where it would otherwise have been considered impossible. Extensive comparisons of cattle feeds have been made in feeding trials, and much information has been compiled therefrom. The most recent feature of this work is the testing out of sunflower silage as a cattle food, which experiment is described in the last report.

Similar feeding trials have been made with sheep and hogs and also to a lesser degree with horses. Experiments in the housing of these kinds of stock have also

be profitable fowl for the Manitoba farmer to keep. Trapnesting and selective breeding are conducted with this object in view. Experiments in housing, feeding and managing poultry are carried on. The Manitoba Egg-laying Contest is located at the Brandon Farm.

Horticulture

While the money making features of Manitoba farming are securing the largest amount of attention, the beautification, sheltering and victualling of the farm home are also kept well to the

fore. The horticultural department is one of the strong features of this Farm. Perhaps vegetable crops receive most attention. Vegetables do exceptionally well in this climate, and tests of varieties and of methods, which are conducted in wide range, are followed with keen interest by folk from country and town alike. Great interest has followed the work in tomato growing in particular.

The testing out of hardy kinds of fruits suitable to the prairie climate continues to be an important feature of the work. Considerable success has been attained with plums and bush fruits. Apples, though the subject of much laborious effort, have not as yet shown great success, only small crabapples having proved really hardy.

The hedges, shelter belts and ornamental grounds on the Brandon Farm are a constant source of delight to visitors, and a demonstration of what

can be done in tree, shrub and flower growing in the prairie country. They and the fruits and tender vegetables that grow in their shelter are a proof of the importance of providing shelter for the home garden. The collection of trees and shrubs grown on the grounds shows a wide range of varieties that are hardy and suitable and the display of flowers each year is a source of information and inspiration as to what can be done in regard to home beautification in Manitoba.

The Brandon Farm is operated with the intention of assisting the Manitoba farmer in the development of all phases of his farming. No one department is specialized in to the extent of crowding out other lines of work, but an effort is made to serve all equally well, and to preserve a just balance between the different fields of activity.

REPORT OF COW TESTING, 1921

A. H. WHITE, CHIEF DAIRY PROMOTER

DURING the year 1921, the cow testing work of the Dominion Dairy Branch has been carried on under the same general policy which was adopted in 1918. The farmers supply the necessary equipment to weigh the milk and keep samples for three days during each month. The Dairy Branch, through the Dairy Promoter of each province, organizes and supervises the testing centres and compiles the records received at the office in Ottawa.

Under this plan, there has been a substantial increase in the number of herds and cows under test and also in the total number of Babcock tests made. This increase has been due, largely, to the splendid efforts of the Quebec Dairy Inspectors in the cow testing campaigns put on during the month of March in the years, 1920 and 1921, and which were authorized by the Dairy Branch of the Quebec Department of Agriculture. In Ontario, the work nearly doubled

during the past year and this is due to the assistance and co-operation of the provincial Dairy Instructors and the District Representatives.

No doubt, these campaigns have brought cow testing to the attention of many individual farmers and during the past year, numerous requests have been received for milk record forms. Hundreds of daily milk record forms have been sent out as a result of these requests.

Provinces Take Over Work

The past year saw some changes in the supervision of the work in Saskatchewan and Manitoba. On May 1st, the Saskatchewan Dairy Branch took over full control of the cow testing work in that province. In Manitoba, the Provincial Dairy Branch has complete charge of the field work in organizing and supervising the testing centres while the Dominion Dairy Branch has

THE AGRICULTURAL GAZETTE OF CANADA

compiled the records and paid for the testing.

Individual Feed Records

It is fully recognized that along with the milk record should go the feed record for each cow. This question of better feeding is very important and is being brought to the attention of the farmers continually. It takes some extra time and care to keep a feed record but quite a number of farmers have seen its value and have kept such

a record during the year 1921. The Dairy Branch has supplied feed record forms, free of charge, to all dairymen who wished to keep a record of the feed consumed by each individual cow.

A report on cow testing work must, necessarily, contain many figures and the following figures have been arranged in concise, tabular form to show the extent of the work during 1921 and also some of the benefits and results accruing to different districts and to individual farmers.

TABLE I—Total Number of Herds, Cows, Testing Centres and Tests Made, by Provinces, 1921

Province	No. Herds	No. Cows	Number of Testing Centres	Number of Samples tested
Alberta.....	65	793	27	3,924
British Columbia.....	40	163	5	691
Manitoba.....	176	1,173	34	2,858
New Brunswick.....	111	822	14	3,553
Nova Scotia.....	338	2,119	46	9,685
Ontario.....	767	9,373	93	39,557
Prince Edward Island.....	198	1,227	19	7,017
Quebec.....	3,499	32,225	473	127,462
Totals.....	5,194	47,895	711	194,747

The figures for Saskatchewan have not been given in the foregoing table as the work was carried on by the Provincial Dairy Branch. The figures for British Columbia do not represent the full extent of the work in that province. These figures are for only a few herds in districts where there is no

organized co-operative cow testing association. There were at least six co-operative associations operating in British Columbia during the past year with an average membership of twenty-five or twenty-six farmers with from 400 to 500 cows under test.

TABLE II—Comparison of the Number of Herds, Cows, Testing Centres and Total Tests made in 1919, 192 and 1921

Year	No. Herds	No. Cows	No. of Testing Centres	Total No. of Tests	Average No. of Tests per cow
1919.....	2,416	22,517	348	94,585	4.20
1920.....	3,847	33,382	564	139,418	4.17
*1921.....	5,194	47,895	711	194,747	4.07
Increase, 1919 to 1921.....	2,778	25,378	363	100,162	

*Saskatchewan figures for 1921 not included. Increase is really more than shown.

These figures show conclusively the progress of the cow testing movement in Canada. It will be seen that the number of herds and cows under test in 1921 is more than one hundred per cent greater than the number under test in

1919. The largest increase has again taken place in Quebec but the percentage increase in Ontario is higher, being nearly one hundred per cent. These figures, of course, do not show the total number of herds and cows being tested

THE AGRICULTURAL GAZETTE OF CANADA

throughout the different provinces. There are many farmers who are testing and do not send in reports to the Dairy

Branch at Ottawa, but who, in a great many cases, receive record forms to help them in this work.

TABLE III—Number of Herds and Cows Recorded for Eight Months or over and the Average Production by Provinces, 1921

Province	No. Herds	No. Cows	Average Production		
			Milk	Test	Fat
			Lb.		Lb.
Alberta.....	18	230	7,048	3.26	229.6
British Columbia.....	14	47	6,932	3.98	276.5
Manitoba.....	4	37	7,317	3.13	228.9
New Brunswick.....	31	184	5,024	3.98	200.4
Nova Scotia.....	109	535	5,283	4.10	216.8
Ontario.....	94	963	7,136	3.44	245.8
Prince Edward Island.....	67	318	6,569	3.68	242.1
Quebec.....	221	1,948	4,946	3.88	192.3
Saskatchewan.....	22	186	6,861	3.32	227.8
Totals and Averages.....	580	4,448	5,801	3.69	214.1

A comparison of the number of herds and cows in Tables I and III will show the comparatively small number of herds and cows tested for the full milking period. This is a difficulty hard to overcome when so many centres have the testing done at local cheese factories which operate for only a few months

during the flush season. There are many herds tested for only five, six or seven months which, had they been tested longer and the records used in compiling an average production per cow, would tend to increase rather than decrease the figures given in Table III.

TABLE IV—Average Production by Provinces for Years 1915, 1919 and 1921

Province	Average Production 1915		Average Production 1919		Average Production 1921	
	Milk	Fat	Milk	Fat	Milk	Fat
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
Alberta.....			5,198	190.7	7,048	229.6
British Columbia.....			6,669	262.8	6,932	276.5
Manitoba.....			5,177	183.4	7,317	228.9
New Brunswick.....	4,558	183.3	5,857	235.6	5,024	200.4
Nova Scotia.....	4,909	200.7	4,962	195.5	5,283	216.8
Ontario.....	6,294	217.4	6,725	243.0	7,136	245.8
Prince Edward Island.....	5,235	198.8	6,586	243.4	6,569	242.1
Quebec.....	4,472	172.9	4,798	182.8	4,946	192.3
Saskatchewan.....	4,392	169.2	4,944	192.9	6,861	227.8
General Average.....	5,285	195.5	5,522	207.9	5,801	214.1

The above figures show the progressive increases in milk and fat production which inevitably follow consistent and intelligent cow testing. The increases are small from year to year but this is due to the large number of new herds and cows recorded each year. Less than half of the herds recorded in 1920

were recorded for full periods in 1921. The inclusion of so many records of new herds and cows tends to keep down the average production per cow.

Increased production per cow in testing centres and in individual herds is very much higher as the following figures indicate.

THE AGRICULTURAL GAZETTE OF CANADA

TABLE V—Increases in Production at Testing Centres in Ontario

Centre	No. of Cows	Average Production 1919		No. of Cows	Average Production 1921	
		Milk	Fat		Milk	Fat
		Lb.	Lb.		Lb.	Lb.
Southwold Station.....	14	7,828	272.0	14	9,315	322.0
Woodstock.....	37	8,046	265.3	56	8,629	289.2
Colborne.....	61	8,622	302.4	53	9,413	335.6
Atwood.....	28	8,736	283.1	25	9,352	288.2

The improvement in the average production per cow at these four centres in Ontario is exemplary of what is taking place at all the centres where records

are kept for a few consecutive years. The figures for centres in all the provinces show similar increases.

TABLE VI—Increases in Production of Individual Herds

Herd No.	No. Cows	Average Production 1919		No. Cows	Average Production 1921	
		Milk	Fat		Milk	Fat
		Lb.	Lb.		Lb.	Lb.
1.....	7	7,742	248.8	8	10,402	324.6
2.....	20	8,421	277.1	21	10,017	337.2
3.....	12	8,559	272.8	14	11,912	379.8
4.....	10	9,696	358.4	15	10,080	371.3
5.....	13	9,787	301.9	13	10,686	328.0
6.....	2	6,432	218.0	11	8,464	287.5
7.....	12	5,017	181.9	18	5,644	213.8

It will be noticed that the average production per cow in all these herds is much above the estimated production of the average dairy cow in Canada. Yet, in two years' time, these farmers, by weeding out poor producers, using better feeding methods and keeping better sires, have been able to make a substantial increase in production even when the production to begin with was over 9,000 pounds of milk.

There were many strong associations and centres operating during the past year in all the provinces. One of the good associations organized was at Cope-town, Ontario, where some 28 herds and 317 cows were tested. Nineteen herds with 218 cows finished the full year

with an average of 7,340 pounds of milk and 247.5 pounds of fat. The largest centre was in the locality of Metabetchouan, P.Q. In this district, 94 herds with 1,385 cows were tested for some part of the year. Some 49 herds and 616 cows were tested for eight months or longer and the average production was 5,207 pounds of milk and 205.7 pounds of fat.

Notwithstanding the large increase in the number of herds and cows under test in 1921, there are many dairying districts which could improve the average production per cow by organizing a cow testing association which would have as its aim the betterment of the dairy stock in that locality.

THE AGRICULTURAL GAZETTE OF CANADA

NUMBER OF HERDS, COWS AND TESTS BY PROVINCES, 1919, 1920 AND 1921

Province	1919			1920			1921		
	Herds	Cows	Tests	Herds	Cows	Tests	Herds	Cows	Tests
Alberta.....	64	820	2,539	38	515	3,124	65	793	3,924
British Columbia.....	34	215	1,235	24	102	610	40	163	691
Manitoba.....	83	1,035	3,793	78	580	2,214	176	1,173	2,858
New Brunswick.....	250	1,065	5,144	180	1,177	4,245	111	822	3,553
Nova Scotia.....	207	2,714	12,623	372	2,224	11,876	338	2,119	9,685
Ontario.....	417	4,214	18,204	446	4,911	20,835	767	9,373	39,557
Prince Edward Island.....	241	1,307	5,907	164	976	5,765	198	1,227	7,017
Quebec.....	1,046	10,374	42,428	2,474	22,229	87,594	3,499	32,225	127,462
Saskatchewan.....	74	773	2,912	71	668	3,155	.....	.....	.....
Totals.....	2,416	22,517	94,584	3,847	33,382	139,418	5,194	47,895	194,747

Saskatchewan figures not included for 1921, Provincial Government took over the work.

ILLUSTRATION COMMUNITY WORK IN DUNDAS COUNTY, ONTARIO

BY F. C. NUNNICK, B.S.A., CHIEF, DIVISION OF EXTENSION AND PUBLICITY, DOMINION EXPERIMENTAL FARMS BRANCH

THE illustration work in Dundas county had its inception under the Commission of Conservation. Dr. Jas. W. Robertson, Chairman of the Committee on Lands of the Commission; was primarily responsible for the plan of this work, which remained under the Commission until the last year of the five-year period, when, upon the repeal of the Act constituting the Commission, it was transferred to the Experimental Farms Branch of the Dominion Department of Agriculture. Throughout the whole period, Mr. F. C. Nunnick, Agricultural Advisor of the Commission of Conservation, and now Chief of the Division of Extension and Publicity of the Experimental Farms Branch, was in supervision of the work.

First Survey and Illustration Farms

During the spring and summer of 1912, the Committee on Lands of the Commission of Conservation selected a number of Illustration Farms in each of the provinces of the Dominion. These were, in most instances, chosen from among the farms that had been previously visited in connection with an agricultural survey conducted by the

Commission during 1910 and 1911. This survey had been conducted on groups of contiguous farms numbering from 30 to 50 farms in each group. There were 35 of these Illustration Farms chosen in all. The Commission, through its Committee on Lands, planned and supervised the illustration work conducted on these farms during the years 1913 and 1914. In 1915 they were taken over by the Dominion Department of Agriculture, and through the Division of Illustration Stations of the Dominion Experimental Farms System, the supervision of the work was continued during 1915. This concluded the three-year period previously arranged for by the Commission.

Illustration County Suggested

At the annual meeting of the Commission of Conservation in 1916, after having reviewed the results of Illustration Farm work previously conducted, Dr. Robertson, Chairman of the Committee, said:—

"I now hope for, and desire, an Illustration County, after the plan of our Illustration Farms. In it, there

could be tried out and put to the proof, the theories and concepts of the best things that have been found useful there, or elsewhere. We need such a district where all the several activities of all these various agencies could be seen properly co-ordinated and at their best. The first step would be to conduct a thorough survey of a district, a county for example. For that, the hearty co-operation of provincial authorities and municipal authorities would be sought. The Commission of Conservation is an appropriate and competent agency through which the survey could be conducted. The survey would deal with such questions as (1) farm labour, (2) co-operation, (3) roads and transportation, (4) education, and (5) opportunities for recreation and the development of a richer social life. In every one of these matters the problem has been solved, at least for the present, in some instance or some district. Let us suppose that the Commission discovers that a plan or method has been found adequate and effective in some rural community. Can the same or another method be enlarged and developed into a system suitable for many cases or several communities? Can the same, or other methods, be organized and applied to serve a whole country?"

Agricultural Survey Conducted

In pursuance of the plans of the Lands Committee regarding a thorough survey of a district, 400 farms in Dundas county, Ontario, were visited by a representative of the Commission during the summer of 1916. These farms were chosen in groups of 25 contiguous farms, there being 16 such groups, i.e., four groups in each of the four townships in the county. This general survey yielded much information, which served as a guide in planning and commencing the Illustration County work, as many phases of farm operations and farm life

were included in its scope, among them being the following:—

1. System and methods of farming, such as planning, rotation of crops, seed selection, cultivation, live stock, use of manure, etc.
2. Farm labour, machinery and equipment.
3. Business methods, in selling, buying, co-operation, etc.
4. Public service, such as railways, roads, telephone, rural free delivery, etc.
5. Educational work through schools, school gardens, home gardens, boys' and girls' clubs, school fairs, etc.
6. The promotion of intellectual, social, moral and ethical progress.

In one county co-operation among farmers is more general than in other counties; in another there are better roads; in another social life is more pleasant; in another there are better farming methods; in still others some one phase of farm life or practice is further developed. In no one county are all of these things at their best. With a view to effecting improvement along all of these lines in harmonious relation, the county of Dundas was chosen in the spring of 1917, as an Illustration County. After Dundas county was chosen, the co-operation of the Provincial and Dominion Departments of Agriculture, and the people themselves, was sought in an endeavour to assist in the improvement of those things that pertain to the agricultural and general welfare of the county.

Illustration County Chosen

In connection with the improvement of general farming methods, arrangements were made with 16 farmers in the county, who became known as Illustration Farmers, to put into practice on their farms certain definite lines of work which would serve as object lessons for the various districts. In gen-

THE AGRICULTURAL GAZETTE OF CANADA

eral, the scheme of co-operation between the Commission and the farmers included in its consideration the following matters:—

The planning, commencing and carrying on of a suitable systematic rotation of crops for each farm and its neighbourhood.

The sowing of the varieties and strains of grain suitable to the farm and the district.

Different rates per acre to ascertain the most suitable rate of seeding.

The sowing of different amounts per acre of clover and grass seed, to ascertain the most suitable rate of seeding of both home-grown and purchased seed.

The sowing of various summer pasture mixtures.

The practising of after harvest cultivation, extra and more thorough cultivation to kill weeds, conserve moisture and increase yields.

The introduction of labour-saving devices and up-to-date machinery.

The care and economical use of farm yard manure.

The encouragement of a farm garden.

Directly and indirectly encouraging many other means to make the farm more profitable, the farm life more satisfactory and pleasant, and to help to keep the young people on the farms.

The sixteen farmers chosen were: Thos. Johnston, Glen Stewart; Samuel Smyth, Dundela; Orrin Strader, Brinston; Andrew Fawcett, Inkerman; M. J. Loughlin, North Mountain; Wm. McIntyre, Mountain; R. K. Graham, South Mountain; Chas. F. Marcellus, Dunbar; Arthur Nash, Morrisburg; Durham Wells, Hoasie; Whitteker Bros., Williamsburg; W. H. Casselman, Chester-ville; Arthur Christie, Winchester; F. Frank Davidson, Winchester; G. C. York, Morewood; R. Ellis, Iroquois, who sold his farm in 1919, but the work was continued by Errington and Driscoll, to whom the farm was sold.

Plan of the Work

The illustration farmers were chosen after conference with the Agricultural

Representative of the county, who had been in the county for a number of years and knew the county and the farmers intimately. The farmers, thus chosen, received no salaries, nor did they become the beneficiaries of the public through political patronage, but were chosen because of their ability as leaders and their willingness to co-operate in this work. They retained the full ownership and full control of their farms. At the same time, they received counsel as to systems of rotation, methods of cultivation, the selection of seed, etc.; but the general administration of the business affairs of the farms was directed entirely by the illustration farmers themselves. They were asked to put into operation those things which, after conference with the Agricultural Advisor, they considered would be profitable to them. The agricultural survey had revealed the fact that there was much room for improvement of the methods being followed on farms in the county of Dundas.

Materials Supplied

Each illustration farmer was supplied the first year with approximately the following amount of pure seeds.

Seed for two acres, registered Banner oats;

Seed for two acres, mixed oats and barley, Ligowo or Daubeny oats and O. A. C. No. 21 barley;

Red Clover, ten pounds northern-grown seed and five pounds per acre extra for up to 10 acres of crops seeded to make the seeding at least 10 pounds per acre;

Summer pasture, two acres, (various mixtures);

Corn, one-half bushel each of four suitable varieties;

Vegetable garden collection;

Formalin for treating seed oats for one field, where the farmer would agree to treat the seed;

Potatoes, one bag Green Mountain, one bag Irish Cobbler, of New Brunswick grown seed.

Work has also been conducted on these farms during the five-year term with lime, fertilizers for corn, potatoes, oats and orchard, alfalfa and sweet clover seeding, buckwheat for smother crops, etc. From the above it will be seen that the expense in the way of supplying material has been very small, and, it should be added, the amount supplied after the first year was considerably reduced.

During the five years the Agricultural Advisor visited each of these 16 farmers every three or four weeks from early spring to late autumn for the purpose of conference and to inspect the results of the various lines of work undertaken.

Results of First Year's Work

The following brief extracts from some of the letters received from the illustration farmers in the county, who conducted this practical work on their farms, will indicate some of the results of the work of the first year, viz., 1917.

Orrin Strader, Brinston, Ont.—"I sowed 10 pounds of clover seed to the acre on five acres, and three pounds per acre on the balance of the field. The results are 50 per cent better on the part sown 10 pounds to the acre, and I think it will stand the winter much better as it has made a shelter for itself. Judging from this result, I am of the opinion that 10 pounds to the acre should be sown at all times.

"The Banner oats, which were sown two and one half bushels to the acre, have proved a splendid variety. I cannot tell how much per acre they will yield, as we have not threshed them yet, but I am well pleased with the crop.

"The Green Mountain potatoes yielded 22 bushels from 90 pounds planted, and the Irish Cobbler only 9½ bushels from the same quantity of seed. They were planted side by side. The Green Mountains were more suitable on our soil this year."

Durham Wells, Williamsburg, Ont.—

"Both in straw and grain the Banner oats supplied by the Commission of Conservation gave a much heavier yield

than my own oats. The mixed grain grown from your seed produced plumper grain, but about the same quantity of straw as that grown from my own seed. I am much interested in the seeding down of this field. I sowed the seed as directed by you, one acre with ten pounds of northern-grown clover seed and eight pounds of grass seed; one acre with ten pounds of clover seed grown by myself and eight pounds of grass seed; one acre with ten pounds McDonald's clover seed and eight pounds of grass seed; one acre with thin seeding, i.e., with eight pounds of a mixture of clover and grass seed, which is my usual seeding.

"This autumn the thin seeding has a much thinner stand than the thick seeding. It will be interesting to see how this field comes out next summer.

"In another five-acre field I sowed one acre with one bushel of vetches and two bushels of oats; one acre with one bushel of peas and two bushels of oats and three acres with wheat, oats and barley. Now this field was sowed to save five acres of meadow for hay that would otherwise have been pastured. The growth was very rank, as you remember, so we pastured only one-half of the field, fencing off half, and cutting it for feed for winter. This two and one-half acres furnished my main pasture for the months of July and the best part of August, increasing the yield of milk from my 12 cows by 35 pounds per day, and maintaining it a month or more when old pastures were very short. I saved by summer pasture ten tons of hay, two loads of vetches, six bushels of oats, one load of peas and oats and three loads of wheat, oats and barley. In addition, I seeded the field down for meadow or pasture for next year.

"The potato seed you supplied gave more than double the yield of my own seed, 90 pounds of Green Mountain yielding over 25 bushels, and the same weight of Irish Cobblers, 20 bushels.

"My vegetable garden was prized very highly, giving abundance of vegetables of the very best quality."

R. K. Graham, South Mountain, Ont.
—"The Irish Cobbler potatoes gave a yield of 22 bushels and 40 pounds per bag; the Green Mountains, 19 bushels and 17 pounds, each outyielding our own variety, the American Wonder."

Thomas Johnston, Brinston, Ont.—
"The results of my illustration work have been very satisfactory. They are as follows:—

"Clover.—5 pounds to the acre and 10 pounds to the acre were sown side by side, under the same conditions. There is a very marked difference in favour of the 10 pound seeding.

"Oats.—The Banner oats turned out well, yielding, I would judge, between 75 and 80 bushels from the three bushels of seed received from the Commission. This variety seems to be adapted to this soil.

"Peas.—Turned out splendidly.

"Corn.—Wisconsin No. 7 and Bailey turned out well, the latter being the better.

"Potatoes.—Green Mountain were of large size and turned out well, yielding about 18 bushels from one and one-half bushels of seed. Irish Cobblers yielded about 22 bushels. The yield would have been much larger if the potatoes had been properly cared for; owing to shortage of help they were neglected. The Irish Cobblers appear to give the best results in this soil."

Samuel Smyth, Iroquois, Ont.—
"Our oats had no smut, as they were well treated, but there was a little on the barley, which was not treated so carefully. We used O.A.C. 21 barley mixed with Ligowo oats. This makes a good early crop for harvesting before the oat crop.

"One and a half bushels each of Green Mountain and Irish Cobbler potatoes yielded 17 bushels and 27 bushels respectively. We sprayed them for blight, thus making the tops stay green longer.

M. Joseph Loughlin, Mountain, Ont.
—"There were some splendid results,

especially in potatoes and corn, from the seed you supplied.

"I had three kinds of potatoes, Green Mountain, Irish Cobbler, and my own American Wonder, planted in the same field. The yield of Green Mountains was 100 per cent better, and that of the Irish Cobblers about 25 per cent better than the yield from American Wonder.

"The Wisconsin No. 7 corn bore more ears than any of the other three kinds—Leaming, White Cap Yellow Dent, and Golden Glow.

"A seeding of 10 pounds of clover to the acre shows superior results to a 5-pound seeding, but there is no marked difference between the northern and home-grown seed.

"We sowed spring rye, peas and oats for summer feed. It grew splendidly and made excellent feed."

F. Frank Davidson, Winchester, Ont.
—"I will try to give you as best I can an account of the work conducted on our farm this year. In every case it proved profitable.

"The Banner oats looked very nice in the field and yielded more per acre than our own oats sown in the same field.

"The O.A.C. No. 21 barley gave good results, but the Ligowo oats sown with it were a little thin. The seed was all treated and there was very little smut.

"The Early Bailey corn sown in drills, gave a heavy crop of stalks and was well eared. It is earlier than Wisconsin No. 7 and Leaming, which were sown in the same field.

"One bag of Irish Cobbler potatoes yielded 14 bags of nice potatoes with no rotten ones, while one bag of Green Mountains yielded 16 bags with only four rotten ones.

"I am very much pleased with the results of the clover crop. The northern-grown seed looks fine, while the home-grown is not far behind it. This was sown at the rate of 10 pounds per acre. Seeding at 10 pounds per acre looks much better than that sown at six or

seven pounds. I am much in favour of thick sowing."

Arthur Christie, Winchester, Ont.—
"During the early part of July, six acres of sod that had been pastured off short, and which was badly infested with twitch grass, was ploughed, and the sod rolled down with a roller weighted with stones. Two acres were sown to buckwheat. Unfortunately, when the buckwheat was about an inch high a hail storm pounded out half of it. However, the balance came on very rapidly and we harvested about 80 bushels of good grain from the two

it up well in the spring and plant corn in squares.

"The stubble land which was not seeded to clover was ploughed after harvest, cultivated at different times as required, and again ploughed this fall. The oats and vetches which we sowed for green feed proved an 'eye-opener' to me and solved the question of summer feed for dairy cows; of course they give best results when fed in conjunction with ensilage. Our fall ploughing is well advanced and we are looking forward to and planning for a still bigger crop next year."



Second Crop Clover for Seed on the Farm of A. E. Nash, Morrisburg, Ont.

acres and, while ploughing this fall, I noticed very little twitch grass. Two acres were sown to rape, in drills 30 inches apart, and cultivated three times. This rape not only produced a lot of feed for our cows, but also dealt a death blow to the twitch grass. The remaining two acres were summer fallowed and worked with both the disc and broad shear cultivator at short intervals during the summer. We are now ploughing the whole field. We will give it a good coat of manure this winter, work

The above extracts from letters received from the farmers themselves, referring to their work during the first year, indicate clearly the interest taken by them in the work. They also illustrate the nature and simplicity of the work attempted. As each year's work was planned, new features were arranged for. Many of these farmers were making suggestions after the first year and were anxious to try other things, not new-fangled or risky things, but other improved methods that had

been put to the test on the Experimental Farms. After the first year's work these farmers desired to try several varieties of oats, corn, etc., to see which variety was best suited to their soil and conditions.

Varieties Grown

The varieties of oats that have been used during the five years are Banner, Victory, Gold Rain and Twentieth Century. Daubeney oats have been used in mixed crops of oats and No. 21 barley. A number of varieties of silage corn have been tried. Those proving the most popular among the dents being Wisconsin No. 7, Golden Glow, White Cap Yellow Dent, Bailey, and Improved Leaming. Some flint varieties were tried, such as Longfellow, Salzer's North Dakota White Flint, and Quebec Yellow No. 28. The dents and flints have been grown separately and in mixture.

In the case of potatoes it was found that practically all of the 16 farmers chosen were planting "just potatoes". Those who gave a name to what they were planting stated that their seed was badly mixed. Irish Cobbler, Green Mountain, and Dooley were the varieties introduced. New Brunswick and home-grown seed was planted side by side for a number of years. Until 1921 the New Brunswick seed gave considerably higher yields than the home-grown seed. The season of 1921 being very bad for the potato crop in the county, poor yields were secured regardless of the source of the seed planted. The Irish Cobbler has become very popular in the county, because it has yielded well and is a good keeper. One profitable result of the illustration work in the county is that where very few of the farmers were previously using known varieties of oats, barley, potatoes, etc., all of the 16 illustration farmers and many of their neighbours are now growing varieties of proven excellence. This one point alone means much to the farmers of the county. Many of the illustration farmers have for the last three or four years

disposed of all their pure seed grain and potatoes among the neighbouring farmers. A number of them state that they could have sold for seed, two or three times as much as they grew. In some instances the neighbours have brought their own ordinary potatoes and traded them to the illustration farmer for Irish Cobbler or Green Mountains which he had kept for his own table use. This shows how keenly anxious the neighbours were to obtain better seed when they saw the increased yields obtained therefrom.

Different thicknesses of seeding of clover have been tried each year. This has been very interesting and has attracted much attention in the locality surrounding each Illustration Farm.

Alfalfa and sweet clover have been tried. In 1920 one acre of alfalfa was seeded on practically each of the 16 farms, and on the whole withstood the winter of 1920-21 much better than common red clover. Many of the farms in Dundas county, however, are not suitable for growing large areas of alfalfa, in fact, the one-acre plots tried were usually placed on some particularly favourable spot. It was shown quite clearly, however, that on land which was drained either naturally or artificially, alfalfa would grow very well. It could, on many farms, be used to advantage in seeding mixtures. Sweet clover has given excellent results when used for pasture. It has in no instance, where tried, been winter killed. It has been used also for hay but is found to be somewhat difficult to cure in catchy weather. Where well cured it has made splendid hay.

Quack grass is very bad in many places through the county, and buckwheat has been used very successfully as a smother crop.

It was found that very few of the farmers were giving much attention to the home garden. The small collection of garden seeds provided each year was carefully selected from good varieties of proven merit, with the result that all of the 16 farmers report taking a very

greatly increased interest in the garden. They state that their supplies of garden produce have been greatly increased in quantity and improved in quality.

Results after Five Years

As a result of the five years' work, nine of the illustration farmers have changed the plan of their farms and fields to make systematic rotation of crops more easy, and are now practising a more suitable and systematic rotation than they did before commencing this work. They all report that the systematizing of their rotations and the other methods of management adopted have increased their yields, the estimates varying from 20 to 30 per cent. Practically all of the 16 farmers report fewer weeds on their farms than there were five years ago, and that their farms are more fertile. Fourteen of the 16 farmers state that the following of a definite plan has made their work more profitable and very much more interesting. Here is a quotation from the report, after the final year, of Mr. Sam Smyth, Dundela:—

"Yes, it is the same old farm under a new manager. Through the Commission we have had the results of the Experimental Farm brought right home to us, which we apply to our own farm."

Fourteen of the 16 farmers state that they are now sowing varieties and strains of grain more suitable to their farm and neighbourhood. Twelve of the farmers state that they were not previously sowing selected seed. All of the farmers agree that it pays to sow selected seed and state that good seed has become a thing of much greater importance to them than previously.

The majority of them state in their reports that they were not previously sowing enough red clover seed to insure a good catch. The increase in yield of hay since the heavier seeding of clover has been practised is estimated by the farmers at from 25 to 50 per cent. Six of the farmers who were not previously

growing their own clover seed are now doing so.

Eleven of the illustration farmers report making more use of labour and time saving devices than before. Ten are using wider implements than before. Ten report making more use of three or four-horse teams than previously. Nine state definitely that they are now planning and adjusting their farm work to better utilize the help on the farm than they did before.

Ten state that they are now applying the manure more advantageously while nine report that they are exercising more care to prevent waste than ever before. Practically all of the illustration farmers report that they now more fully realize the value of the farmyard manure than they did before beginning this work.

Practically all of the farmers state that they are taking more interest in their farm work generally than before, and that the young people on the farms are taking more interest than formerly.

Quotations from Farmers' Reports

Practically every one of the 16 farmers state that their yields and profits have been increased, although a number of them call attention to the fact that the profits during 1921 were low, due to a slump in prices of farm products. The increase is estimated at from 25 to 40 per cent by the various farmers.

Sam Smyth, Dundela, remarks.—"It is hard to estimate the value to us of the work conducted by the Commission of Conservation and the Experimental Farm. Not only has it been valuable from a financial point of view, but the greater interest we take in the work is worth a great deal. Our neighbours are watching our crops pretty closely and comparing their methods with ours. Many of them are adopting what we have adopted at the suggestion of the Agricultural Advisor of the Commission."

Whitteker Bros., when asked to estimate the percentage of increase in crops, state.—“It is rather hard to answer the above, but we have profited greatly from the work of the Commission and Experimental Farm, not alone financially but in other ways. Many of our neighbours have secured seed from us and are now carefully selecting their seed and sowing known varieties.”

Arthur Nash, Morrisburg, speaking of increased profits, says: “Every-

they have been trying things out in the same manner as we have.”

Arthur Christie writes as follows.—“I think my profits are fully one-third greater than formerly. My farm is cleaner, and I may say that our neighbours are following the advice given by the Agricultural Advisor in charge of this work, and are sowing known varieties of grain and taking better care of the farm manure than formerly.”



Twenty-acre field of Twentieth Century Oats on the farm of W. H. Casselman, Chester-ville, Ont. The grain was free from smut and weeds, and the entire crop was sold for seed to neighbouring farmers and others.

thing is so cheap now that the profits are pretty small. Thanks, however, to the Commission of Conservation for showing us how to produce more with the same amount of labour, which helps out a whole lot these times.”

G. C. York, Morewood, states.—“I am not prepared at present to accurately estimate the value I have received from the Commission of Conservation and the Experimental Farm, but it has been very valuable to me. My neighbours have been continually watching me and I have found that

Many other such examples could be given, but these serve to show the nature of the results of the work.

During the five years of practical work on these farms in Dundas county many meetings were held in connection therewith. A number of meetings were held during the winter following the first summer's operations, at which illustrated lectures were given showing improved methods of farming, the results from various tillage methods, the results of thick and thin clover seeding, the use of labour-saving

THE AGRICULTURAL GAZETTE OF CANADA

devices on the farm, the profits to be derived from three and four-horse teams with wider implements, etc. It was interesting to find that quite a number, of the young farmers particularly, had during the winter time made at home some of the devices illustrated at these winter meetings and were to be found using them the following summer. The writer has in mind a number of specific instances where this occurred. During the years following the first season's work, that is 1918 to 1921 inclusive, a number of field

yield and ability to stand winter conditions.

Inter-Township Excursions

During one summer, inter-township automobile excursions were organized, that is, the illustration farmers and their neighbours of one township motored over to the next township and visited as many of the Illustration Farms as possible during the day. Many of the farmers made a day of it, taking their lunch with them, and thoroughly enjoyed studying the results of



Farmers' Meeting.—On this field a tillage test had been conducted for the control of mustard

meetings were held on the Illustration Farms, to which all of the neighbours were invited. The neighbouring farmers took a great interest in the illustrations being conducted, there being more than 100 bona fide farmers present at some of the meetings. The results of the work of previous years were reviewed, such as the difference to be seen in thick and thin clover seeding, the effect of buckwheat as a smother crop, the results of tillage tests, comparison between alfalfa, red clover and sweet clover, as regards both

the work on the Illustration Farms in the neighbouring townships. There being four townships in Dundas county, four days were given over to this work. Seeing is believing, and the studying of the crops right in the field and the results of the various improved methods adopted, strongly impressed the lessons which are derived from the use of pure seed, treatment for smut, improved methods of tillage, etc.

As an example of this the following incident, which occurred on one of the

motor trips, is mentioned. A field of oats, where the seed had not been treated for smut, was being examined. A square yard of the crop was chosen at three different points in the field and the stems on each square yard were counted. It was found that 37 per cent, by actual count, of the oats was smutted. On the next Illustration Farm visited a field of oats was examined, the seed of which had been carefully treated for smut. In fact, this man had been carefully treating his seed each year for three years. Three or four of the visiting farmers walked through the grain and examined the field very closely, but no smut was found. This proved to be a very striking object lesson to all of the farmers present regarding the efficiency of the formalin treatment of seed grain for smut. One man said, "No farmer can afford to have 37 per cent of his grain destroyed by smut."

Upon several occasions during the five years, automobile excursions were organized and run to the Central Experimental Farm, Ottawa. As many as 600 have taken these excursions upon some occasions.

Annual Conference

During each winter, while this work was being conducted in Dundas county, the illustration farmers were called together at Winchester for conference, when the results of the past year's work were reviewed and a thorough discussion of plans for improving the work during the following summer took place. These gatherings were very helpful to the farmers themselves and were also beneficial in having the farmers from the various parts of the county become better acquainted. A banquet was usually held in the evening to which a number of townspeople were invited and a general get-together spirit was thus promoted.

Boys Remain on the Farm

It is interesting to note that every one of the 16 farmers chosen in the spring of 1917 stayed with the demonstration through the full five-year period agreed upon. One man sold his farm but the man who bought it took up the work enthusiastically, and carried on in a very satisfactory manner. Seven of the 16 farmers had grown-up sons at home, there being 14 of these young men in all. It is interesting to note that not one of these 14 grown-up sons left home during the five years in which this illustration work was being carried on. The fathers of these boys themselves stated that it had added very greatly to the interest of the farm work, and that they were convinced that this increased interest had had an influence in keeping the boys from going away to the cities.

Agriculture in Schools

When the Commission of Conservation began this work in Dundas county, there were but 13 public schools in which agriculture was being taught. In less than 18 months, agriculture was being taught in 76 of the 78 rural schools in the county. This result was due to the efforts of the late J. W. Forrester, Inspector of Public Schools, and the Agriculture Advisor, in putting on a very active campaign in regard to this matter.

In the fall of 1917 the Agricultural Advisor addressed the teachers' convention in the county on the subject "More Agriculture in Public Schools." Again, in 1918, agriculture received a prominent place on the programme of the annual convention of the teachers of the county. During the summer of 1918 a large class of 28 teachers from the county took the short course in agriculture at the Ontario Agricultural College, Guelph. In 1919 a still larger class, 45 in all, from Dundas county,

THE AGRICULTURAL GAZETTE OF CANADA

took the short course, this being the largest class from any one county that had ever taken this course at the Ontario Agricultural College.

Horticultural Societies

When this illustration work was begun in 1917 there was but one horticultural society organized in the county. There are now five live societies carrying on this good work. The Agricultural Advisor and the Agricultural Representative of the Ontario Department of Agriculture took an active part in the organization of these new societies.

A very noticeable improvement in the farm home-grounds and surroundings has taken place during the last five years. Indeed, a drive through the county in the summer time is a pleasure, a fact frequently mentioned by many who have visited the county to inspect the illustration work during the last two or three years.

Miscellaneous Activities

The Agricultural Advisor has assisted in a great many other matters in the county, having acted as judge at a number of agricultural fairs, and at many of the school fairs and horticultural society flower shows. Many addresses were given during the winters and at the field meetings held on the farms. The Agricultural Advisor also judged the ploughing competitions conducted under the general supervision of the Agricultural Representative. Ploughing matches and tractor demonstrations were organized and carried out. In fact, no opportunity was lost for assisting the farmers of the county or for co-

operating with the Provincial Department.

It is difficult to measure the money value of this kind of work in a community. It has been clearly shown that these 16 farmers are farming much more intelligently than they were five years ago. The neighbours are copying the work of these men, good seed of varieties of proven merit has been distributed widely, and in many ways better agriculture has been demonstrated and its gospel taught. The farmer is much more likely to put into practice on his own farm something that he sees successfully and profitably done by a neighbour, than something he only hears discussed on a public platform. One further advantage of this kind of work is that it starts the farmer thinking for himself, which is very essential to the success of his operations. The 16 men who carried on the work have co-operated most cordially. There has been confidence on their part and great expectations of benefit. All of them say they have received great benefit from the work. They have had larger crops, cleaner fields, more money, and pride of achievement, all of which is of prime importance to Canadian farming, and cannot help but exert a very beneficial influence on the surrounding community.

In conclusion the writer desires, on behalf of the Lands Committee of the Commission of Conservation and the Dominion Experimental Farms system, to extend hearty thanks to the Illustration Farmers who have so cordially co-operated in carrying out this valuable work, which, it is hoped, will serve as a guide whenever further work of this nature may be undertaken.

THE APPLICATION OF SEED LEGISLATION IN CANADA

BY C. SWEET, CHIEF, SEED DIVISION

THE object of seed legislation in Canada is threefold; first, to protect and encourage the producer of good seed, inasmuch as he is able to market his product on the basis of merit in quality and purity under standard grades; second to protect the consumer of seed, who receives protection when buying subject to these standard grades, and third, to protect the seed trade, wholesale and retail, which receives the same protection as both the producer and consumer when purchasing or selling.

The law is framed to encourage the dealer in good seed rather than the dealer in poor seed, and is also aimed to facilitate the trade in seed, both domestic and export, by virtue of the grade standards provided. This is accomplished, in part, by making it possible to buy or sell on the home market or abroad by telephone, wire or cable on any particular day's market price. Most countries already quote seed on the basis of trade names, but these are not at all uniform in character.

The marketing of commercial grain in North America under grade is now fairly well established. In the United States, wheat is divided into the six classes: Hard Red Spring Wheat, Durham Wheat, Hard Red Winter Wheat, Soft Red Winter Wheat, Common White Wheat, White Globe Wheat, and in each of these classes there are grades from No. 1 to No. 5, based upon certain standards of quality and purity.

In Canada, wheat is marketed under three classes: Spring Wheat, Goose Wheat and Winter Wheat. In our western inspection division the following grades are provided under the Spring Wheat Class: No. 1 Manitoba Hard Wheat, No. 1 Hard White Fife, No. 1 Manitoba Northern, No. 2 Manitoba Northern and No. 3 Manitoba Northern. These are the standard grades

and are not varied from year to year. Standards are also provided for lower grades, which are made at the beginning of the inspection season in accordance with the quality of season's crop. Standard grades, Nos. 1, 2 and 3 for other classes of grain are provided, and the marketing of these grades is done on the basis of these standard grades.

Sample markets are used in conjunction with the grades issued by the Government inspectors, but this is only done to assist in making sales, as the transactions are finally made under the market quotations for the grades purchased.

A start was made last winter at a meeting of the International Crop Improvement Association held at the Chicago Live Stock Seed Show to discuss the standardization of International grades for registered or improved seed, with the view of putting such standards into effect.

We have in Canada one seed law, the Seed Control Act, which governs the commercial sale of seed and is applied the same in all the provinces. Each province has its own regulations on its statutes to provide protection for weed control, but in the matter of seed control no attempt is made to duplicate or institute a provincial seed act.

Under the Seed Control Act exemption is provided for the traffic in seed between farmers when delivery is taken of the seed on the farm where it is grown, unless it is represented as graded seed in which case it is sold under the Act. This exemption does not permit farmers to sell seed below grade No. 3 or in other words "rejected seed." With the exception of seed sold for feed or to seedsmen for the purpose of re-cleaning, all other seed that enters the trade comes under the Act and is sold under standard grades or labelled. Timothy, red clover, mammoth clover,

alsike, and alfalfa were the only seeds at first required to be graded, but now all cultivated clovers and grasses may be sold under the same grades, and seed grain, corn and flax seed are also sold under special grades. If these two latter groups are not sold under grade they are sold subject to labelling with the name or names of the noxious seeds if present over a certain number per ounce or pound. These grades are, in the case of grasses and clovers, Extra No. 1, No. 1, No. 2, No. 3 and Rejected, and with grains, Extra No. 1, No. 1, No. 2, and are based upon standards of purity, germination and general quality of the seed. These standards are fairly definitely set and do not require much altering from year to year with the exception of general quality, which may be slightly raised or lowered to meet the requirements of each year's seed crop. In practice this latter point is arrived at through consultation between the Seed Commissioner and Chief of the Seed Division and the Wholesale Seed Trade, who meet annually and bring samples and compare qualities to arrive at minimum quality standards for the different grades. Grades are also provided for grass and clover mixtures. Vegetable and flower seeds are not required to be graded but are sold subject to labelling the packets, with the year in which they were filled, if sold in sealed packets, and to marking with the percentage of germination if the germination falls below certain fixed minimum standards. The marking of percentage germination applies to all seeds the same as to vegetables.

Penalties for violations of the Act are provided and the provisions and regulations of the Act are enforced equally and without favour in all the provinces.

In addition to the Seed Control Act, Canada has seed importation regulations which control the import of seed, making it necessary for imported seed to come under the same regulations as domestic supplies, and prohibiting

entry of shipments refused entry to another country or of rejected seed. The provision has been made under these regulations whereby any exporter of seed to this country may have his shipments delivered direct to the purchaser without being held at the port of entry by the customs official. To take advantage of this regulation, exporters of all kinds of seed with the exception of vegetable and flower seeds should submit representative samples of each shipment to any of the Canadian Government Seed Laboratories for official test and grade, marking these test numbers and grades, when received, on either the bags or invoice. Such shipments upon arrival in this country are sampled and reported to the Seed Branch and delivered to the purchaser without any delay. If they are not marked with the Canadian test number and grade, the seed is sampled and held in bond, pending report from this Branch as to its eligibility for entry. The former course is preferred as it causes no delay or inconvenience by the Canadian importer at a time of the year when he usually requires his seed for immediate use. The privilege of delivering seed marked with the grade and test number, without holding in bond, and a report of the analysis may be cancelled to any exporter of seed to this country, if it is found that the practice of marking a wrong grade on the seed is being followed. Shipments of root and vegetable seeds may be delivered without holding in bond to all consignees and without requiring any special markings.

The organization for carrying these laws into effect is vested in the Seed Branch of the Dominion Department of Agriculture. The Commissioner and Chiefs of Divisions comprise the headquarters staff at Ottawa, and the outside work is divided into six districts under the direction of District Inspectors having headquarters at Truro, Quebec City, Ottawa, Toronto, Winnipeg and Calgary. Each District Inspector

THE AGRICULTURAL GAZETTE OF CANADA

has under his supervision a staff of permanent and seasonal inspectors whose duties are to see that the Seed Control Act is observed by all dealers within their inspectoral territory; and in addition, they study seasonal seed supplies and markets which are reported to Ottawa where the information is assembled and put into shape for publication by the Markets Division.

Four Seed Laboratories serve the growers and seedsmen, these being located at Ottawa, which is the Central laboratory serving Eastern Ontario, Quebec and the Maritime Provinces; Toronto, which has lately been opened for Western Ontario; Winnipeg for

Saskatchewan and Manitoba and east to lake Nipigon; and Calgary for Alberta and British Columbia.

Following the testing of seeds in the laboratory, certificates of analysis, giving the names and number of weed seeds and impurities per ounce or pound, and the official grade are mailed to the parties sending the samples.

Quality Standards

For the purpose of grading seeds we have two main groups including, grasses and clovers and seed grains. The standards for grasses and clovers are as follows:—

	Noxious weed seeds per oz.	Other weed seeds per oz.	Other cultivated seed per oz.	Cleanliness	Minimum germination
Extra No. 1.....	0	30	Trace	Clean	90%
No. 1.....	5	100	1½%	Clean	85%
Alsike.....	10				
No. 2.....	20	200	3%	Reasonably clean	76%
Alsike.....	40				
No. 3.....	80	400	5%		63%
Alsike.....	160				
Rejected.....	over 80	over 400	over 5% Grade a mixture		

Twenty-four species of farm weeds are included in our noxious weed seed list. These are the most troublesome weeds found in the Dominion. Of course, no one district would have all the weeds on this list, but as we have only one seed law, we have therefore only one noxious weed seed list. In the administration of the law we find that it works out to advantage to have the complete noxious list apply in all the provinces as this is a protection in the interchange of seed from one province to another.

The other weed seeds included in the second general heading affect the grade of the seed, as noted, according to the number per ounce found in the sample.

Cultivated seeds are considered separately from weed seeds and percentages by number are used in grading grass and clover seeds and the number per pound in grading grains.

Cleanliness as the heading implies, refers to the condition of the sample in respect to cleaning. No sticks, straws, dirt or other inert matter are allowed in the higher grades, Extra No. 1 or No. 1, and the seed must also be well milled to remove the small or shrunken seeds, leaving a uniform sample to come under these grades. A slight variation is allowed in this respect for Grade No. 2. Seed containing weed seeds up to the number specified for Grade No. 3 or otherwise unfit for No. 2 seed is graded No. 3. This grade, consequently, is not in very great demand in this country.

Under the last heading, germination, colour and soundness are considered. We do not lay much stress upon colour, except as being an indication of the vitality of the seed. If a sample of grass or clover seed is dull in colour and

contains shrunken, brown seeds or is musty or has any other indications as to its vitality being impaired, such a sample is held for germination test before the grade is given.

Grades for seed grain are Registered, Extra No. 1, No. 1 and No. 2. The standards included in the first two grades may be briefly stated as requiring a minimum of 95 per cent for Registered seed and 90 per cent minimum germination for Extra No. 1, and that they both be as nearly pure as to variety as it is possible to get them. These grades are only issued when the combined inspection of the growing crop and the cleaned seed indicates a conformity to all the requirements of the grade.

At the present time Registered seed is handled by the Canadian Seed Growers' Association, but it is expected that

this grade will be included in the Seed Control Act, thereby receiving the same protection by law as the present government standards. This arrangement will also bring into practice the principle of government guarantee of genuineness of stock, which is being requested by a number of careful purchasers requiring high-class pure variety seed. No. 1 seed grain is a commercial grade of seed, the purity of variety of which is not vouched for, but is clean, of standard weight and contains not more than one noxious weed seed per pound and germinates not less than 80 per cent. No. 2 seed grain is the same in all respects as No. 1 except that it may contain up to ten wild oats per pound. These two grades were made to meet the general demand for a good safe class of seed to buy in commercial quantities for annual requirements.

SEED PRODUCTION IN ALBERTA

BY G. M. STEWART, DISTRICT INSPECTOR, SEED BRANCH

DURING the past year Alberta again led all the provinces of Canada in the production of seed, both in the quality of the seed produced and in the resulting cash returns received by the growers. The fertility of the soil, the prevailing climatic conditions, and the careful attention that is being given the various farming problems in that province by the growers themselves and the men connected with the Federal and Provincial Governments, have brought seedsmen of both Canada and United States to realize more than ever that Alberta cannot be surpassed in the production of seed grains, as well as many varieties of clovers and grasses. Sufficient proof of the splendid achievements in seed production was given at the Chicago International Hay and Grain Show last December, and the results of Alberta's exhibits undoubtedly turned the attention of all those interested towards this province. Alberta growers secured the

highest awards possible for oats and alfalfa seed, in competition against all comers. In addition to these awards many other prizes were secured for wheat, oats, peas, alfalfa, and clover. It was largely owing to the gaining of these awards that many sales were afterwards made to dealers in Eastern Canada and the United States. In the case of certain varieties the demand far exceeded the supply available.

During the past couple of years, a great impetus has been given the production of high grade wheat and oats, through the co-operation of the Field Husbandry department of the University of Alberta and a number of the progressive farmers of the province. These men secured from that department, seed wheat and seed oats of known strains, pure as to variety. This seed was sown under the best conditions possible, and proper inspection was given the growing grain and the seed finally produced. If the inspector reported favourably,

THE AGRICULTURAL GAZETTE OF CANADA

the seed was given registration with the Canadian Seed Growers' Association, which is the only organization registering seed in Canada. As the yields in many cases were greater than those secured from seed of unknown origin, other farmers became interested and in return procured and seeded purer varieties, with the result that several thousand bushels of registered seed oats and wheat were produced in the province last year; and there is every reason to expect that this year there will be many thousand bushels of these pure varieties of seed ready for distribution in the province, with a surplus for shipment to other provinces and countries.

Alberta's oat crop has long been a matter of pride to our farmers, and it is interesting to learn that about half a million bushels of No. 1 Seed Oats were shipped out of the province this spring. This seed was purchased by farmers in every province east of us, as well as by many in the Northern and Central States.

Agriculture throughout Southern Alberta has experienced many reverses, but as larger areas are brought under irrigation, and better farming methods are practised, better conditions are certain to result. Moreover, Alberta has been most fortunate in securing exactly the type of settler this southern country demands. These settlers are, for the most part, men who have come from irrigated districts in the United States, and they are able to carry on successfully the work of farming on our irrigated lands. They are largely responsible for the great success of those districts.

As all farmers familiar with this type of farming realize that alfalfa is one of the best crops that can be produced in irrigated areas, particular attention has been given to the problems connected with alfalfa production. As many varieties of alfalfa are not hardy enough to withstand the rigorous conditions which the climate imposes, there have been, unfortunately, many disappoint-

ments. However, the difficulties have for the most part been overcome, and it has been demonstrated that genuine Grimm alfalfa is quite suited to the climate, and farmers are insisting that seedsmen supply them with this particular variety of alfalfa seed. With a view to assisting in the production of this variety, agricultural experts employed by the Federal and Provincial Governments, and the Canadian Pacific Railway Department of Natural Resources have been giving a great deal of study to this plant, in order that more definite information might be secured as to its habits. This work has resulted in the registration of this seed by the Canadian Seed Growers' Association. During the past year some eight thousand pounds of genuine Grimm alfalfa seed were registered with this association, and marketed by growers in the Brooks district. As yet this is the only district that has been able to produce Grimm alfalfa seed acceptable for registration, and it was some of this seed that secured first place at the Chicago Fair last year. Largely on account of past successes, a large increase in the acreage sown to this crop will be made this spring. It is expected that at least ten thousand acres will be added to the present area producing alfalfa on irrigated lands.

Both the Federal and Provincial Governments have been making greater efforts than ever before to interest farmers in the production of high quality seed. New varieties of clovers and grasses have been introduced from Europe by the Seed Branch of the Dominion Department of Agriculture, and distributed throughout the province to several dependable farmers with a view to having the different seeds tested out. If they are found to be suited to our climatic conditions the production of these new varieties will be encouraged, as a ready market in Europe can be relied upon for large amounts of the seed.

In the so-called Peace River district of Northern Alberta, it has been demonstrated that timothy seed can be pro-

THE AGRICULTURAL GAZETTE OF CANADA

duced much more profitably than grain crops, and during the past year a considerable quantity of timothy seed has been marketed from that part of the country. Many farmers throughout that new district would be well advised to give particular attention to the growing of timothy seed, rather than to devote their whole attention to the growing of grain crops, as a profitable market for large quantities can be found yearly in Eastern Canada as well as in Scotland and England.

It is generally agreed among agricultural authorities interested in the improvement of grain production in this province, that the best method of bring-

ing up the general standard of the various grains produced in Alberta is for each farmer to follow the practical plan of setting aside each year a small area of well prepared clean ground to be seeded with registered seed which he knows to be suited to his prevailing conditions. The seed obtained from this plot should be set aside for his own use the following spring. If all farmers would follow out this suggestion, Alberta would probably outdistance all the other provinces of the Dominion in the production of clean grain of high quality, which would find a ready market and prove most profitable to the producer.

PART II

Provincial Departments of Agriculture

NEW BRUNSWICK'S ACTIVITIES UNDER THE AGRICULTURAL INSTRUCTION ACT

BY O. C. HICKS, B.S.A.

TO the province of New Brunswick, which derives its revenue mainly from the Crown domain, the financial assistance provided by the Agricultural Instruction Act is the chief means through which the development of educational and demonstrational work in agriculture is made possible.

At the time the Act was passed, the province was without an educational policy on agriculture. There were no agricultural schools; hence there had been no courses of instruction offered in scientific agriculture. There was but one dairy school, which was in use as a commercial creamery and accommodated short-course dairy students for a term of only six weeks each year. Women's Institutes had been established; but in livestock, dairying, horticulture, and poultry-keeping, demonstrational work had only begun, while assistance to other phases of agriculture had been confined to the lecture method, and was carried on by a corps of lecturers travelling on demonstration trains and by itinerant agricultural institute speakers. Agencies such as these, already established by the provincial department, had been working to supply information and education to the farming community; and to meet the administration expenses of such work, including the encouragement of Agricultural Societies, a provincial appropriation had been made annually. For the year 1912 this appropriation amounted to \$41,745.69. For the past nine years an average of \$82,712.46, and a total of \$744,412.19, has been granted by the provincial Government. The Agricultural Instruction

grant has been used to supplement this work as well as to develop some new lines of endeavour. The total expended from this subsidy to March 31, 1922, was \$524,420.59.

From the grant has been met the costs of the erection, equipment and maintenance of various buildings designed to facilitate the teaching of agriculture. A building in which to hold regular courses of instruction in general agriculture was erected and equipped at Sussex. Similar equipment was installed at the Fisher Vocational School, Woodstock. Two dairy schools, one at Sussex and the other at St. Hilaire, were provided, but the cost of equipment only of the Madawaska Creamery, St. Hilaire, was charged to the grant, while the cost of the Dairy Building and equipment at Sussex (destroyed by fire in December, 1917), was met from this source.

Dairying

The appropriations for dairying were used to conduct annual dairy short courses, and to provide for aid to the makers of dairy products through a system of factory and creamery inspection. Two inspectors are employed.

A reconstruction period in the dairy industry in this province has been in progress. The small creamery is passing, and the new era has brought the centralized creamery in its place. There are now three large co-operatively owned creameries operating. One is situated at St. Hilaire, one at Moncton, and one at Fredericton. The amounts paid to patrons of these creameries for the

THE AGRICULTURAL GAZETTE OF CANADA

past year were, \$23,939.93, \$192,995.92, and \$60,918.10 respectively.

The cheese industry has so strengthened under a system of factory inspection, grading and marking of the product that New Brunswick cheese is now sold on its merits in competition with the best of Canadian cheese. The system of sales by "boarding" for cheese and butter marketing was introduced in 1919. An annual dairy show was instituted in that year, at which during the past three years samples of the make for each month from factories and creameries were exhibited.

Livestock Encouragement

Encouragement to the livestock industry under the grant has been extended by maintaining a staff which directs its efforts towards the improvement of farm breeding stock, the introduction of new marketing methods

for livestock products, and to the establishment of Boys' Clubs.

A policy of aiding Agricultural Societies to purchase pure-bred bulls by a cash bonus has required that every animal for which an application for the bonus has been made shall be inspected and graded by an official of this department. Furthermore, each animal must be tuberculin tested and declared to be a non-reactor before being eligible for a bonus. The inspection and testing of these animals and likewise the inspection and certification of stallions under the provisions of the New Brunswick Stallion Enrolment Act are performed by officials of this division.

The extent to which wool grading and co-operative selling has developed in the province since the inauguration by the Live Stock Division in 1918 of a campaign to popularize the selling of wool in the grease is as shown by the following:—

	1918	1919	1920	1921
Amount handled.	31,735 lbs.	55,840 lbs.	69,449 lbs.	41,070 lbs.
Number of patrons.	317	547	674	340

Boys' Pig Club work has been conducted very successfully. Through the workings of these breeders' clubs the number of pure-bred pigs kept for breeding purposes has been increased.

Poultry

A most significant change has taken place in the attitude with respect to the farm flock since the era of poultry demonstration work under the Agricultural Instruction Act began. Previously little attention had been devoted to egg production on the farm. Now poultry keeping is conceded to be an important branch of farm economy, and an industry which constitutes a foundation stone in a greater industry.

Through educational propaganda for modern poultry house construction, the operation of poultry fattening stations, the establishment of egg circles, the distribution of pure-bred utility poultry through eggs and day-old chicks from

bred-to-lay strains, the conducting of laying contests, and the establishing of Boys' and Girls' poultry clubs, every phase of poultry keeping—with the possible exceptions of the marketing problem and the business of wholesale raising of day-old chicks—has been modernized and developed to a considerable degree.

One result of the establishment of Boys' and Girls' Clubs has been the standardization of the poultry product. One variety of chickens only, the Barred Plymouth Rock, was adopted for club work. Eighteen clubs were organized with a membership of 242 and 222 in each of the years of 1918 and 1919. These clubs represent a distribution of 21,565 hatching eggs and 1,340 day-old chicks. In addition to the club distribution several thousand Barred Plymouth Rock hatching eggs were procured by the Poultry Division for distribution to school children under the

supervision of the Elementary Agricultural Education Division.

Soils and Drainage

The appropriations under this caption were expended on demonstration work for fertilizers, lime pulverizing, farm under-drainage, clover seed production, and field crops experimentation.

To carry to a successful issue the plan of work relating to these subjects, a staff of instructors and demonstrators was provided and a portable lime-pulverizer, a clover huller, a traction ditcher, and a tile making machine were purchased and operated.

As a result of demonstrations in compounding fertilizers, a considerable saving to individuals has been effected by the abandonment of the practice of buying factory-mixed goods in favour of buying fertilizer constituents and mixing them on the farm. A soil survey of arable land to ascertain the soil reactions was instituted, while field experimental work has been conducted, concurrently with the working of local limestone deposits, to demonstrate the response in crop yields to liming with pulverized limestone.

The clover-huller has been operated by the Department as a demonstration feature to encourage farmers to grow their own seed. Previous to its introduction very little red clover seed was produced in the province. Hundreds of farmers are now so thoroughly convinced that clover seed-growing is a profitable undertaking that they now own share-stock in itinerant clover-hullers.

An important work in the reclaiming of wet land has been performed through the campaign for under-drainage. Demonstrations in trench digging by machine and in tiling were conducted in eight counties. Consultations, surveys, specifications, estimates, and drainage maps were made by the officials connected with this campaign.

Horticulture

The development of the apple growing industry at a rapid rate followed the provision of a provincial horticulturist and staff by means of the assistance furnished by the federal grant.

Demonstration and commercial test orchards have been established; illustration orchards have been supervised; apple-packing schools and short courses in horticulture have been conducted; co-operative apple shipments have been encouraged, and fruit exhibits prepared.

The test orchards have demonstrated the advantage and profit of renovating neglected trees, as well as the most economical cultural practices, and the fact that the extension of the industry depends upon the planting of suitable varieties.

The examination of orchards and of orchard sites, and the giving of assistance in pruning, spraying, grafting, and planting of orchards has been carried on, as well as the handling of nursery stock, spraying materials and supplies for the New Brunswick Fruit Growers' Association.

Bee Keeping

The Apiary division, which owes its inception to the Agricultural Instruction Act, has done a great deal to spread a knowledge of correct beekeeping methods. The status of the industry when the division was organized is indicated by the fact that many bee-keepers were using old fashioned box hives, and smothering off the surplus swarms in the fall.

The industry has now progressed to a point where movable frame hives, manufactured within the province, are in general use. Out-of-doors wintering is practised, and the province produces nearly sufficient honey to supply the local market.

The New Brunswick Bee-keepers' Association, with a present membership of one hundred and thirty-eight, has been organized, and during the past

two years handled supplies to the value of five thousand dollars.

So effective is the control of bee diseases under the Apiary Inspection Act that the province is now believed to be free from Foul Brood.

Women's Institutes

The allotment to Women's Institutes provided for an annual grant of five dollars to each branch institute as well as financing the work directed by the Institute division. An organizer and a staff of demonstrators have been maintained, and short courses in home economics have been conducted at practically all points where accommodation could be secured.

In the nine years that have elapsed since the grant became operative, the Women's Institute movement has grown from an organization having forty-one institutes with 856 members to one having ninety-four branches with a membership of approximately five thousand.

The Institutes occupy a unique position in the community. No question of race, religion or creed is permitted to obtrude itself in the councils of the institutes, but only such matters as have to do with the betterment of social, educational and industrial conditions are dealt with. The Institutes co-operate with government departments and other approved organizations whenever necessary. During the war their response to the call of the Empire was most praiseworthy. Large sums of money and immense quantities of clothing and soldiers' comforts were forwarded. In the period following, the institutes have given liberally to war relief and to public charities at home. Due to the efforts of this organization rest-rooms for women have been built, civic improvements have been effected, war memorials have been erected, and organized nursing has been promoted during periods of epidemic.

Elementary Agricultural Education

In providing for elementary instruction in nature study and agriculture the

Department of Agriculture was brought into close relationship with the Board of Education by the New Brunswick Schools Acts. A Director of Elementary Agricultural Education was secured, and under his supervision, the prescribed course of instruction, including school gardening, home plots, and home-projects was instituted in the public schools in grades I—V (ungraded) and grades I—VIII (graded).

In order that qualified teachers may be available, special courses of instruction are provided at the summer schools of science. The full course covers two summer sessions and leads to a certificate. Cash bonuses are paid under certain conditions to teachers that hold certificates and conduct school gardens, the minimum being ten dollars and the maximum twenty-five dollars. School trustee boards are paid grants up to fifty dollars to assist in the purchase of seed and equipment for the school garden. Gardening and poultry rearing as home projects have been encouraged. Seeds and eggs are distributed to pupils undertaking, with the parents' consent, to conduct projects, keep records, write a composition, and to exhibit their produce or stock at a school fair. Trained supervisors visit each pupil having a garden or project and give the necessary instruction.

A monthly bulletin, *The Rural Education Monthly*, is published and issued to all rural teachers as a medium of communication between teachers and the Department.

Agricultural Representatives

The agricultural representative service, instituted in 1917, is maintained jointly by funds supplied through the Federal grant and by provincial appropriations. Salaries and travelling expenses are charged to the grant and office rent to the provincial appropriation. Two offices only are maintained at present. The agricultural representative service has given assistance in carrying on the propaganda undertaken by the Department for improved sires;

for wool marketing, and for the better care of the flock. Very successful short courses for young farmers have been instituted.

Other Work

Other important work performed under the Act includes the campaign

for the suppression of the Brown-tail moth and for the eradication of powdery scab of potatoes. The cost of the preparation and printing of bulletins and circulars for the dissemination of information on agricultural subjects has also been met from the subsidy.

THE MANITOBA AGRICULTURAL SURVEY

THE chief purpose of the Manitoba Agricultural Survey begun in 1921 by the staff of the Manitoba Agricultural College with President Bracken as chairman of the Survey Committee, has been to obtain the actual facts affecting the profitable production of crops and live stock on the farms of the province, and to enquire into the general economic and social conditions obtaining in the different parts of the province.

The work so far done includes a detailed survey of fifteen representative municipalities and a general study of the whole of the settled area. The particular features enquired into were crop yields; the fertility of the different soils; the climatic conditions; the cropping practices in vogue; farm organization as it affects efficient and permanent production; marketing practices and the effect of quality of product on process and profit; the financial state of the farmer; the distribution, increase, movement, and nationalities of the population; the living conditions of the different communities, and the general economic condition of the industry.

Except for the work of editing, the following information is now available for the final report:—

1. A summarized statement by the Chairman of the Committee, President Bracken.

2. A copy of each of the maps, charts and diagrams prepared to represent graphically some of the results arrived at.

3. A statement of the geology of the soils of the southern part of the province.

4. A statement discussing the question of the composition and fertility of southern Manitoba soils so far studied.

5. A brief but unfinished treatise on the climate of Manitoba.

6. A short statement on the population of Manitoba, touching upon the distribution of the racial types; increase in population in certain districts, and the decrease in others.

7. A statement on the forestry resources of Manitoba.

8. A comprehensive statement dealing with the various natural resources of the province, including mining, fishing, the fur catch, and water powers.

9. A statement showing the history and present condition of that phase of agriculture which deals chiefly with crop production.

10. A preliminary report on the live-stock situation.

11. A statement on horticulture in Manitoba.

12. A brief statement regarding weeds.

13. A report on the losses caused by insects and the best methods for their control.

14. A report on the plant disease situation, including the remedial treatments recommended.

15. A statement on farm profits, costs and prices.

16. General reports on the agricultural conditions in the municipalities of Arthur, Brenda, Swan River, North Cypress, Whitemouth, and Gilbert Plains.

In his summary of the work to date, President Bracken presents a number

THE AGRICULTURAL GAZETTE OF CANADA

of instructive facts which the survey has emphasized.

Of the \$100,000,000 of agricultural wealth produced annually by the province of Manitoba, \$70,000,000 comes from crops, \$25,000,000 from live stock (dairy products, cattle, sheep, and swine), \$5,000,000 from poultry, and \$250,000 from bees. Other primary sources of wealth comprise mines, fisheries, forests, and furs, aggregating \$7,250,000 annually; so that the importance of agriculture is overwhelming in comparison.

Among farm crops the high relative value is noted of wheat \$35,000,000, oats \$15,000,000 and barley \$8,000,000; while dairy produce, \$12,000,000, and cattle, \$10,000,000, bulk large among the live stock products.

The average size of the Manitoba farm at the present time is given at 288 acres and the total number of farmers is placed at 55,000.

The chief limiting factor in the yield of crops is the relatively low rainfall; but the distribution is favourable, as a large proportion of it comes during the period of crop growth. Another important factor is the frost-free period, which ranges from 70 days in the north and west to 110 days in the south. The shortness of the frost-free period compared with that of areas farther south limits annual crops to such as are quick maturing, and the low winter temperature limits perennial crops to such as are very hardy. Fortunately the experimental work that has been done, states the report, gives accurate and wholly trustworthy information as to the crops best suited to Manitoba conditions.

Another feature of the climate, the effect of which has not been given sufficient consideration by the crop grower, is the wide and frequent variation in the matter of precipitation and frost-free periods. These departures from normal cause the greatest losses in districts having the lowest precipi-

tation and those having the shortest frost-free period.

The best soils in Manitoba are found to be equal in essential plant food to the best land in Illinois and Iowa, and are richer in organic matter than those soils.

The effect of a generation of cropping of wheat has been to reduce the nitrogen of the first 7 inches by 20 to 30 per cent, the phosphorous content by an equal amount, and the organic matter by 20 to 50 tons per acre, so that in one generation a quarter of the potential wealth of the surface soil has disappeared. In three decades the average yield of wheat in Manitoba has dropped from 19 to 15 bushels per acre. Nevertheless, Western Canada, with 100 bushels per capita per year, produces more wheat per man than any other part of the world.

Decreased yields through a period of years is nature's warning that soil restoration should be commenced.

Concurrently with the general agricultural survey, a soil survey of the province is being conducted. Results of the chemical analyses hitherto made indicate high potential productiveness. This is reassuring because of the fact that strong soils, now giving decreased yields, can be made through proper methods of treatment to produce larger yields and to continue to grow crops profitably for succeeding generations.

Judging from the composition of virgin and cultivated soil in the older parts of Western Canada, the time has arrived, says the report, when the one-crop system must give way to diversified cropping and soil maintenance.

The live stock population of Manitoba has increased steadily and more rapidly than the wheat acreage. More live stock is required, but live stock is not a popular line of farming, and before it will become so, there must be an aggressive, constructive policy in regard to markets and markets intelli-

THE AGRICULTURAL GAZETTE OF CANADA

gence service. The survey makes apparent that better finishing, saner marketing, and the elevation of the live stock business to a main issue, wider markets, and reduced transportation charges are essential if producers are to be expected to enter into the production of live stock to anything like the extent that is desirable.

No attempt is made to arrive at the cost of producing wheat as this varies with every farmer, every district, and every season. The opinion is expressed that cost of production studies should at once be commenced for the purpose of arriving at the system of farm organization best adapted to the different soil and climatic zones of the province.

Among the losses in farming that are in part preventable, the report instances stem rust, which has caused an average annual loss of over five million bushels of wheat each year since 1916. The extent of insect depredations varies widely from year to year, but it is estimated that the value of production is lowered by seven million dollars annually. Reduction of the wheat crop in Manitoba in 1921 by the Western

Wheat-Stem Sawfly, amounted to 3,555,000 bushels.

Weeds cost the Manitoba farmer \$20,000,000 per year. This is nearly seventy times the annual outlay on the agricultural college.

Every forty million bushels of wheat shipped out of Manitoba takes from her soil plant food having a replacement value of \$12,000,000.

The chief means by which such losses as the above may be reduced to a minimum at the smallest cost is by diversification. The problem in this connection is that of readjusting the organization of the farm. This includes the choice and acreage of each crop, the breed and number of each class of live stock, the rotation to be followed on each soil type and in each climatic zone, so that the greatest return may be secured from the land, from the capital invested, and for the effort put forth.

Other matters which are briefly discussed in the report include Farm Labour, Community Life, Rural Standards of Living, Conditions in South-western Manitoba, Rural Discontent, and the future programme in connection with the survey.

AGRICULTURAL LEGISLATION, 1922

NEW BRUNSWICK

An Act to provide for the incorporation of associations for co-operative Marketing of Farm Products.—This Act provides that where ten or more persons desire to constitute themselves a body corporate for the purpose of marketing farm products co-operatively, and for acquiring and holding necessary land, they may become so by filing in the office of the registrar a certificate in the form prescribed, and rules and regulations verified by affidavit. The fee for filing is fifty cents. Such an association may have field organization of local egg circles, live stock clubs or

other similar community clubs, and all producers in the vicinity may become members by the purchase of at least one share of the capital stock of the central association. Individual holdings of shares shall not exceed two thousand dollars in value.

The Act provides that, before an association commences operations, the members shall agree upon and frame a set of rules for the regulation, government and management of the association which shall contain (1) a mode of convening general and special meetings; (2) provisions for audit of ac-

THE AGRICULTURAL GAZETTE OF CANADA

counts; (3) power and mode of withdrawal of members; (4) appointment of managers and other officers and their respective duties, and a provision for filling vacancies caused by death, resignation and other causes; (5) also provision for arbitration, likewise provision for making and collecting assessments against members on their stock; (6) and general procedure of doing business.

Disputes shall be settled by arbitration. The liability of shareholders is limited to the amount of his share or shares subscribed for. Surplus profits are to be distributed among the members in proportion to the business supplied by each member of the association.

The Women's Institute Act.—This Act defines the objects of Women's Institutes (which are to be non-sectarian and non-partizan) as being for the improvement of social conditions in rural and other communities, and specifies the lines of work in which they may engage; also the procedure to be followed in organizing and incorporating such

institutes, the qualifications for membership, the methods of procedure in the election of officers, the appointment of committees, the holding of meetings, the enactment of by-laws and regulations, etc. Provision is made for an annual grant of ten dollars subject to certain conditions being complied with. Also for the disorganization of institutes and the liquidation of assets. Institutes already in existence may be declared to be incorporated.

The Act further provides for the appointment of a superintendent, and such other officers as may be required. Also for the institution of a provincial advisory board to consist of the Deputy Minister of Agriculture, the Superintendent, and seven or more members chosen at the annual convention; provincial directors of the Federated Women's Institutes to be members, ex-officio, without voting power.

Junior Women's Institutes may be formed under the Act by fifteen or more girls between the ages of 14 and 18 years inclusive; the objects, method of incorporation, etc., being defined.

AGRICULTURAL APPROPRIATIONS

	1921	1922
Grants to Agricultural Societies.. . . .	\$24,000 00	\$24,000 00
Brown-tail Moth Extermination.. . . .		
Butter and Cheese Factories.. . . .	5,000 00	5,000 00
Bonus to Mud Dredges.. . . .	1,000 00	500 00
Contingencies.. . . .	4,200 00	3,500 00
Departmental Salaries.. . . .	7,333 33	8,900 00
Departmental Travelling Expenses.. . . .	3,300 00	3,300 00
Encouragement of Horticulture.. . . .	1,700 00	1,700 00
Immigration.. . . .	10,000 00	8,000 00
Miscellaneous and Insurance.. . . .	2,000 00	800 00
Encouragement of Poultry Raising.. . . .	3,000 00	2,000 00
Encouragement of Stock Raising and Dairying.. . . .	9,000 00	9,000 00
Standing Crop Competition and Seed Fairs.. . . .	5,200 00	5,200 00
Bonus to Wheat Mills.. . . .	2,500 00	2,000 00
Maritime Stock Breeders' Association.. . . .	1,000 00	1,000 00
Lime-rock Crusher and Power.. . . .	1,000 00	900 00
Exhibitions.. . . .	18,583 87	18,000 00
Extermination of Insect Pests.. . . .	200 00	200 00
Printing.. . . .		3,000 00
Grants to Women's Institutes.. . . .	750 00	750 00
	\$99,767 20	\$97,750 00

THE AGRICULTURAL GAZETTE OF CANADA

SASKATCHEWAN

An Act to amend an Act to incorporate the Saskatchewan Co-operative Stock Yards.—Amending Acts were passed dealing with the original Acts creating the Northern and Saskatchewan Co-operative Stock Yards, Limited. In both cases the amendments were the same.

Section 10 in each of the Acts has had added to it power to the company to establish, lease, buy, sell and operate a public killing station in which live stock can be killed and prepared for consumption.

An amendment is also made to section 16 of the original Acts in the matter of disposition of earnings, the following being added: "Provided that such dividends shall be cumulative and that the company may pay out of such surplus unpaid dividends for preceding years."

An Act to amend The Egg Marketing Act.—Section 3 of the original Act has been repealed and the following substituted: "No person shall buy for resale or sell or offer for sale eggs which are unfit for human food."

Section 5 of the original Act has also been repealed and the following substituted: "Every person who receives on consignment or buys eggs for resale, whether from producers or from any other source shall candle the same." This section, however, will not apply where the eggs are candled for such person within twenty hours of the receipt thereof and under arrangements approved by the minister. It is also now provided that all eggs which have been in storage for more than thirty days shall be candled when removed therefrom. Eggs found by candling to be unfit for human food shall, if stamped with a mark capable of identifying them as the property of the producer who offers them for sale be re-candled in his presence if he so requests.

A dealer in eggs must in future keep his license in a conspicuous place on his premises. It is further provided that

inspectors shall have access to all stores, warehouses and premises where eggs are bought, sold or stored for the purpose of inspection. The Act came into force on March 1.

An Act to amend The Farm Implement Act.—Section 3 of the original Act which provided that the Act should apply to the sale of all implements in the province has been repealed and the following substituted: "This Act shall not apply and shall be deemed never to have applied to sales of implements by persons other than manufacturers and dealers but nothing in this subsection shall affect the rights of parties to any action or proceedings pending at the date when this Act came into force."

The Act came into force upon assent, February 9, 1922.

An Act to amend The Horse Breeders' Act.—The only change to the original Act made by this amending Act is in connection with the expenses paid to members of the stallion board. Subsection 3 of section 10 of the original Act is repealed and the following substituted: "Members shall be paid their hotel and travelling expenses while attending meetings of the board. Members other than those whose whole time is at the disposal of the Government or of the University of Saskatchewan shall receive, in addition, an allowance of \$7 for each day or part of a day spent in attending meetings of the board."

An Act to amend The Stray Animals Act.—Under this amending Act it is provided that the council of a municipality may make by-laws for licensing and controlling herders and determining the conditions under which they shall be permitted to herd animals within the municipality, provided such by-laws do not conflict with any by-law passed under section 4 of the original Act and are otherwise in accordance with the provisions of the Act.

THE AGRICULTURAL GAZETTE OF CANADA

The section of the original Act dealing with the issuance of notice of an estray in the pound where the owner is not known has been amended to provide merely that if such owner is not known the poundkeeper shall take his action in the matter of publishing notice in the *Saskatchewan Gazette* without waiting for the expiry of ten days as in the original Act.

The law is also made more clear with regard to the sale of an estray where the owner is known and other points of procedure.

An Act to amend Municipalities Seed Grain Act.—Additional sections are put into the original Act by this amending Act having to do with renewal statements of liens given for seed grain. It is provided that the secretary-treasurer may, within thirty days before or at any time after the expiration of two years from the date of the lien agreement, and from time to time as long as anything remains due in respect of the seed grain advance, renew the agreement by registering a statement showing all payments made on account therefore and the amount remaining due for principal and interest.

This statement when registered shall create a charge in favour of the municipality upon all crops to be grown by or for the seed grain purchaser upon the lands mentioned in the original application during the year in which the statement is registered and the succeeding year subject to existing registered incumbrances.

An Act to amend The Seed Grain Advances Act, 1920.—A new section is added to the original Act having to do with mortgages obtaining title by voluntary transfer. The section reads as follows: "If a mortgagee who has made an advance which has been added to the amount secured by this mortgage and who has entered into an agreement with the government in form A, obtains title to the mortgaged premises without proceedings in court or in the land titles

office, the Provincial Treasurer may, notwithstanding anything contained in the said agreement, pay to the mortgagee such lesser sum as may be agreed upon between the treasurer and the mortgagee in lieu of the amount guaranteed by the agreement.

"In such case the mortgagee shall be deemed for the purposes of the agreement to have obtained a final order of foreclosure of his mortgage, save that the liability of the government under its guarantee shall be limited to the amount so agreed upon."

The Seed Grain Advances Act, 1922.—This Act provides that any mortgagee of land in Saskatchewan, whether under a mortgage heretofore or hereinafter made, may make advances of money to the owner of the mortgaged land or any part thereof to enable him to purchase seed grain.

When such advance is made it may be added to the amount secured by the mortgage which sum shall become part of the moneys so secured, bearing interest at the mortgage rate, being a charge upon the mortgaged land and shall be payable on the first day of November of the year in which a crop produced by the grain purchased by the advance would be harvested, or on such other day as may be specified in the application for the advance.

Where the land is subject to more than one mortgage no subsequent mortgagee shall be entitled to the benefit of the Act who makes an advance without the consent of all prior mortgagees.

Provision is made whereby any owner who obtains an advance under the Act and who expends it otherwise than in the purchase of seed grain or who sells or disposes of the seed grain purchased with such an advance will be guilty of an offence and liable upon summary conviction to a fine not exceeding \$500 or to imprisonment for any term not exceeding two years, or both.

An Act to amend The Agricultural Co-operative Associations Act.—The

procedure for incorporation has been changed by this amending Act and now reads as follows: "Any five or more persons who desire to associate themselves together as an incorporated association for the purpose of producing, purchasing or selling live stock or farm products on the co-operative plan, or for establishing and operating on such a plan any business for procuring and selling farm supplies or rendering services of pecuniary value to farmers or purchasing or otherwise acquiring on the same plan real property to be used as a club room or rest room or for entertainments and gatherings of a public nature may in the presence of a witness sign in duplicate and cause to be filed in the office of the registrar a memorandum of association in writing to which shall be attached an affidavit verifying the signatures."

It is also provided that any association which conducts a retail business and has a paid-up capital of at least five thousand dollars may by a resolution signed by three quarters of the registered shareholders provide that certain subsections of section 5 of the original Act shall not apply to the association. These subsections have to do with the power of the association to purchase and sell for cash and to pledge the credit of the association.

Section 8 of the original Act which provides that at least 75 per cent of the shareholders of every association shall be agriculturists has had added to it a proviso that this section shall not apply to associations incorporated only for the purpose of purchasing or otherwise acquiring on the co-operative plan property to be used as a club room or rest room or for entertainments and gatherings of a public nature.

AGRICULTURAL APPROPRIATIONS

	1921-22	1922-23
Assistance to General Agricultural Interests.. . . .	\$120,500	\$117,000
Assistance to Live Stock Industry.. . . .	50,600	62,300
Assistance to Dairy Industry.. . . .	23,000	31,000
Publicity and Statistical Work.. . . .	22,000	22,500
Improvement and Protection of Field Crops.. . . .	303,500	41,500
Game Protection and Museum.. . . .	37,300	35,300
Co-operation and Markets.. . . .	19,000	22,000
Film and Stereopticon Service.. . . .	12,000	.....
	\$592,900	\$331,600

ALBERTA

Agricultural Societies.—An amendment to this ordinance provides for grants for ploughing matches to the extent of 60 per cent of the money paid out in prizes, up to \$200.

Agricultural Pests.—This is an act providing machinery for the extermination of agricultural pests, passed particularly to deal with the grasshopper pest for 1922. The Act makes it compulsory for farmers to take steps to control pests on their farms, and makes provision whereby the municipal councils of every municipality must take effective measures to that end in

the way of establishing mixing stations for poison bait, and regulating the distribution, which is done among the farmers at cost. Machinery is also provided for Government supervision of such campaign.

Co-operative Credit Societies.—An amendment to this ordinance provides terms under which residents in unorganized districts may form societies or become members of societies in organized territories.

Brand Act.—An amendment provides that the mark of any brand upon stock bearing the Government brand shall

not be any evidence of the ownership of such stock by the owner of the first-mentioned brand.

Dairymen's Act.—Amendments provide for the elimination of the system of cream-buying stations in Alberta. Following this, a system of government graders is to be established at creameries and control points.

Produce Merchants.—This is an Act providing for the licensing and regulation of produce merchants.

Hail Insurance.—Amendments to the Municipal Hail Insurance Act provide for the withdrawal from the operation of the Act of lands on which no crop return was made or hail tax levied. They also provide that the hail board may not make provision for the reserve fund if loss by hail in any one year is more than eight per cent of the total risk of that year.

Weeds.—An amendment to the Noxious Weeds Act provides that not more than \$200 may be charged in any one year against any quarter section of land, in respect to services carried out under the Act.

Prairie Fires Ordinance.—Amendments provide more stringent regulations for combatting prairie fires, provide for fire guardian and chief fire inspector, and that members of all police forces and of rural councils shall be ex officio fire guardians. Provision is also made for commandeering the services of all men over 16 and under 65 to fight fires where necessary, and for the establishment of fire districts.

Provincial Relief Act.—Makes provision for extension of relief to farmers outside municipal districts and for taking mortgages as security.

Southern Alberta Relief Act.—This Act provides a partial moratorium for farmers residing in districts to be designated as drought areas, and provides for commissioners to supervise these districts. Provision is made in this Act that mortgages for debt for seed, twine, farm labour, food and clothing may be put on the crop not to exceed \$500. In cases where security is seized, provision is made for exemption of sufficient to provide food and clothing for the farmer and his family until October, 1923. Provision is further made that consent of a judge must be obtained before legal proceedings are taken.

Municipal Districts Seed Grain Act.—Amendments provide that the limit of advance of seed grain per quarter section shall be \$130 for 1922, limit to one person \$260, and total limit for all advances against any quarter section \$1,030.

Live Stock Inspection.—This is a new Act covering inspection of live stock in the province at public stockyards, abattoirs and elsewhere, which makes some improvements on the old Act.

Domestic Animals.—Amendments to the Domestic Animals Act provide more stringent regulations with respect to animals at large, makes provision for establishment of closed areas in extra municipal districts, and improves the provisions for impounding cattle.

AGRICULTURAL APPROPRIATIONS

Civil Government.	\$ 66,170
Income Account.	848,480
Capital Account.	961,200

THE AGRICULTURAL GAZETTE OF CANADA

DETAILS OF INCOME ACCOUNT EXPENDITURE

Grants to Exhibition Associations..	\$145,000
Judges at Agricultural Exhibitions..	9,500
Institutes and Short Courses..	18,500
Seed Fair..	10,000
Livestock Encouragement Act..	25,000
Destruction of Noxious Weeds..	25,000
Stock Inspection..	32,000
Publication of Official Brand Book..	11,220
Administration of Stallion Act..	9,000
Agricultural and other Statistics..	7,000
Protection of Game..	45,000
Promotion and Encouragement of Dairy Work..	80,000
Schools of Agriculture and Farms..	167,060
Natural History Museum..	500
School Fairs and Grants to same..	15,000
Prairie Fires Ordinance..	44,000
Publicity Commissioner's Office..	23,000
Poultry Marketing Service..	19,000
Women's Institute and Grants..	20,000
Miscellaneous Grants..	18,700
Draft Horse Breeding..	2,500
Immigration and Exhibits..	5,000
Hay and Relief Work..	30,000
Investigating conditions in Southern Alberta..	10,000
Extermination of Agricultural Pests..	12,000
Agricultural Agents..	40,000
Operation and Equipment Farms at Ponoka and Oliver..	25,500
To Encourage Co-operative Marketing..	10,000
Tree Planting and Horticulture..	3,000
Contingencies..	2,000
To provide for Bonuses..	25,000

DETAILS OF CAPITAL ACCOUNT

Livestock Encouragement Act..	\$150,000
Equipment of Agricultural Schools and Farms..	36,200
Promote and Encourage Dairy Work..	10,000
Hay and Relief Work..	170,000
Extermination of Agricultural Pests..	62,000
Operation and Equipment Farms at Ponoka and Oliver..	33,000
Dairy and Poultry Industry..	500,000

MANITOBA AGRICULTURAL APPROPRIATIONS

	1920-21	1921-22
Salaries, Supplies and Expenses (Civil Government)	\$ 18,600	\$ 13,725
Agriculture..	214,920	157,405
Manitoba Agricultural College..	355,458	254,550
Agricultural Publications..	23,500	16,525
Miscellaneous and Unforeseen..	3,000	2,250
Birtle Demonstration Farm..	5,670	4,250
Settlers' Animal Purchase Act..	9,320	.....
Fire Relief..	25,000	.....
Agricultural Survey..	15,000	11,250
Marketing Investigation..	1,000	1,000
Total..	\$671,468	\$460,955

THREE-MONTH COURSES IN AGRICULTURE AND DOMESTIC SCIENCE

BY L. STEVENSON, B.S.A., ONTARIO DEPARTMENT OF AGRICULTURE

THE courses of instruction for Ontario farm boys and girls covering a period of three months as mentioned in the January issue of *The Agricultural Gazette*, terminated on

March 3. The students, the instructors, the supervisors, and all others interested in the movement, expressed the one opinion that these schools were an unqualified success.

ATTENDANCE TABLE

Place	Agriculture		Domestic Science	
	On Roll	Average Daily Attendance	On Roll	Average Daily Attendance
Bolton.. . . .	72	66	74	58
Waterdown.. . . .	60	40	45	30
Strathroy.. . . .	37	25	40	25
Wingham.. . . .	37	30	31	26
Total.. . . .	206	161	190	139

Seventeen specialists were on the staff of lecturers or demonstrators in the agricultural courses and eight specialists were employed for the domestic science courses. These twenty-five instructors moved from school to school in regular order, keeping up the maximum number of lecture periods at each. The school hours of 9 a.m. to 4 p.m. were maintained throughout the course. Examinations were given at the end of each lecture course and a certificate was granted to all students making the required grade. The county and township councils in the counties where the schools were held co-operated with the Department by way of supplying hall

or lecture room space, heating, lighting, and grants for equipment and prizes. The officials of four counties in which the courses were held have expressed a keen desire to have them repeated in 1922-23. The four District Agriculturists that had immediate charge of these three-month courses have expressed a desire for their continuance within their respective counties, in preference to the one-month courses. The Department of Agriculture is making arrangements to conduct eight three-month courses in Agriculture and Domestic Science during the 1922-23 winter season.

PART III

Agricultural Education and Related Activities

RURAL LIFE AND ACTIVITIES FOR WOMEN

BY MISS ABBIE DELURY, DIRECTOR, HOME-MAKERS' DEPARTMENT, UNIVERSITY OF SASKATCHEWAN

THE greatest incentive to agricultural activity on the part of the individual farmer is removed if for any reason the homemaker fails in the performance of her duties or in the creating of a proper home atmosphere. This fact is recognized by the Departments of Agriculture in the different provinces of Canada and in the United States, also more recently in England and Wales, Scotland and Belgium.

The Rural Women's Organizations originated with the women as independent organizations depending on their own efforts; their work was recognized as such a great factor in the success of rural life, that now departments of agriculture initiate this work and give it financial aid as part of the work of the State. The Soldier Settlement Board also recognized this fact by the establishment of a Home Branch.

The Rural Homemaker's Drawbacks

The homemaker fails sometimes:

- (1) Through lack of proper training and experience for her duties;
- (2) In rural life, through discouragement, lack of incentive, monotony, overwork, need of change; hence acquires an unhealthy attitude of mind toward her duties;
- (3) Because of a lack of home-making instincts, misfits.

How the Women's Organizations can help

The Womens' Organizations with the aid of the Department of Agriculture can help all these classes as well as the

homemaker who has made a greater or less success of her work, and these are in the majority in our province. They can all be helped by the department through:

- (1) Literature supplied from time to time as need arises;
- (2) Extension lectures and demonstrations;
- (3) Correspondence with clubs and with individuals;
- (4) Conferences and conventions.

They can help one another in their organization (and this is the greatest good that arises from organization) by working together for common interests and by each giving the benefit of her knowledge and experience for the others. The discouraged woman who has come to look on her work as merely drudgery acquires this state of mind through living in isolation—she cannot see her work as an important part of a great whole.

The Work of Woman's Organization in the Community

When she finds herself working along with other women (1) to procure proper and sanitary school equipment, (2) to establish a hot and wholesome noon luncheon, (3) to have medical inspection of the schools, (4) to establish rest-rooms for the community, (5) to undertake the establishment of community halls for the use of their people, (6) to start or procure libraries for the public use, (7) to procure nursing help for the district, (8) to establish cottage

hospitals and help to maintain them, (9) to hold fairs of different kinds, (10) to have child welfare exhibits and instruction. (11) to assist the less fortunate, (12) to co-operate with and assist other organizations in their works, and (13), best and greatest of all, to create a better and healthier community spirit and to minimize the spirit of hatred, prejudice and intolerance of different kinds that disgrace our community and national life and to further in its stead a spirit of love and open-mindedness and an atmosphere of hospitality—then her work becomes elevated and transfigured in her mind and that is all that is necessary.

Overlapping

There are so many institutions organized for public welfare that the thought arises in the minds of many people that there must be much overlapping and therefore waste of time and material. Our department co-operates with every possible department in the province:

The Provincial Department of Health;

The Education Department in many lines;

The Agricultural Societies;

The Grain Growers;

The Red Cross;

Teachers;

Registered Nurses affiliated with the Provincial Council;

Staff of Department of Agriculture;
University Staff.

The Press

In this we have not found yet any danger of overlapping. The field is just beginning to be covered and there is more than enough for each organization to do. We believe that "all our strength lies in our union, all our danger lies in discord."

Education

It will be sufficient to touch upon two or three of the broader aspects of education as it affects rural life:

(1) There is the necessity of technical or practical education. There may be a danger of over-emphasizing certain phases of technical education as applied to agriculture and even homemaking. We must bear in mind first, last and always that the studies of agriculture and household science are primarily intended to broaden and balance the child's sphere of knowledge and experience and to open for him a wider field in his choice of life-work. It should not be the object of such training to make farmers or mechanics or dressmakers or cooks or homemakers. If so, we are in danger of producing many of the misfits I before referred to.

There is, perhaps, a danger also in this kind of education to place an undue value on the material and economic side of life to the exclusion of what may be called the cultural or spiritual side. It would seem that our civilization has run amuck through this same error.

Undoubtedly we have to give our attention to the material side but there is grave danger of blunting the delicate sensibilities of our children by giving too much prominence to such things. Present-day education calls for more cultivation of the finer sensibilities.

Good Literature in the Home

It has been felt at all times that our agricultural people are often placed at a disadvantage with the dwellers in cities on account of a lack of a certain kind of culture. This is not so true as it once was but is true to a certain extent. The means of much culture had always lain at their doors and has been ignored particularly in the last two or three generations. I refer to the reading of good literature in the homes. This is a practice that has gradually been dying out. One great reason for this is, perhaps, that we have been placing the responsibility for such things on our schools and educative institutions, just as parents have gradually been unloading many more of their responsibilities on these

same institutions, and therefore neglecting the true and natural source—the home. That is why homes are ceasing to be homes in the true sense of the word and are losing their hold on the youth of our time. Without home education all other forms of education must fail to a large extent because they can be, at best, only helps and extensions of the greater home education. The home is responsible for the time spent outside of school—for education and recreation during this time. There is no greater instrument for culture of heart and mind than a love of and familiarity with good literature.

Our Women's Organizations have been doing much to stimulate love of reading. Many of them have organized local libraries and put their communities in the way of getting circulating libraries. Our university gives a grant of dollar for dollar up to ten dollars spent for library books. This is a step in the right direction but the community library can never take the place of home reading and we are trying to make ourselves active in this direction. We have talked this matter over with our clubs for years, but sometimes some definite action is necessary to get a movement under way. For this reason, I should recommend that a yearly grant of ten dollars be given to each club to buy works of good literature for reading in the club and to be used in the homes—a selection could be made from headquarters if thought necessary.

Community Bird Clubs

We all realize, I believe, that the question of recreation and how time outside of school shall be spent is a bigger problem than ever it was before. The casting-off of the parent of this responsibility has given commercial interests their opportunity and they have seized it with a vengeance—so that now we are finding our people dependent on—not their homes or any inner re-

sources which they themselves may have—but on those commercialized forms of amusement. What can be the outcome but a lowering of ideals and perversion of the best instincts. Our communities are so threatened now in this way that there is gradually growing up a feeling in our women's organizations that this is a problem that requires the co-operation of the men's organizations and there is a steady tendency towards community clubs. It is felt that we must do something better. It is with this in mind that the idea of the Community Bird Club came, and for these reasons:

(1) Bird study offers a source of personal happiness and a resource for enjoyment throughout life if begun in childhood.

(2) It fosters fine qualities of character—kindness, gentleness, sympathy, humaneness and a reverence for life as opposed to present-day tendencies toward selfishness, lack of thought for others, brutality and cruelty, and a callousness toward life.

(3) It affords a healthy form of recreation for mind and body.

(4) It opens up other fields of interest and can be made a sort of anchorage around which can be attached literature, music, scientific knowledge and much else.

(5) It can afford a common meeting-ground for men, women and children.

(6) It is a vital problem in agriculture as evidenced by the efforts put forth by our governments, provincial and federal. Their efforts will have to be largely unavailing if the interest and effort of the people is not forthcoming. The effort can be put upon the boys and girls. It will give them a sense of responsibility that will help to prepare them for the lives of citizens.

The Homemaker's Organization

The Homemaker's Organization can in no way be looked upon as a subsidized organization. True, they re-

ceive a money grant from the Department of Agriculture, but, it must be pointed out, this is to help in the interests of the Department of Agriculture. More than that, the women

through their organizations, every year, return to the province in the form of expenditures for certain provincial and community needs, three or four times the amount of any grant received.

SCHOOL GARDENS AND HOME GARDENS

BY G. V. VAN TAUSK, M.A., B.Sc. (Oxon.) B.S.A.

IN discussing the relative merits of School gardens and Home projects the object to be attained has to be taken as the criterion of judgment.

Historically, the School garden is probably the oldest form of agricultural education, as the introduction of such plants antedates formal instruction either by books or in laboratory. The School garden in its modern sense, however, was not introduced as an educational factor until about a century ago in Germany. In Canada, while Round Hill, Annapolis County, and other places in Nova Scotia had successful school gardens as early as 1886, the real impetus to this mode of education was given by the McDonald movement. This movement had for its avowed aim "School gardens as a means of making nature study and elementary agriculture more concrete and valuable, as well as a means of enriching the aesthetic, moral and social training of the rural school." Generally speaking, the aim is the same to-day, whether in rural or urban centres or whether in Elementary or Secondary schools.

The purpose of this discussion is to find out whether the Home project will accomplish this aim and to what extent.

Home vs. School Gardens

From an educational point of view, both the School and Home gardens mean either the practical application of information obtained in the classroom or deductions made in the classroom from the information obtained in the garden. The first of these is the

vocational and the second the cultural point of view. Modern educational practice does not draw hard and fast lines between these two educational aims and therefore instruction in gardening must have both a practical and cultural value. Education, however, to be really worth while, much reach the place where the training is to take root, and that place is the "home" and this is probably the foremost argument in favour of Home gardens.

In comparing the instructions and courses of study in Elementary Agriculture of the Canadian provinces and 16 of the American States (mainly central and N.W.) we find that the following eight aims are typical of all of them—

(1) To offer educational development to the pupil through agricultural (gardening) activities.

(2) To offer an opportunity for the correlation of the practical and theoretical.

(3) To motivate and vitalize the study of agriculture and nature study.

(4) To furnish an opportunity for remunerative activity.

(5) To develop manipulative skill.

(6) To develop a keener appreciation and the proper attitude toward nature and agriculture.

(7) To give the individual student an opportunity for individual development.

(8) To train vocationally (for farming or gardening).

It is the author's experience during 15 years teaching in the provinces of

Manitoba, Saskatchewan, Alberta, and the States of Iowa and North Dakota, that all these aims can be accomplished as well or better in connection with a home garden, than in a school garden.

Garden projects are of three types, (1) productive projects, in which the pupil's efforts result in material returns, like the raising of $\frac{1}{4}$ acre of potatoes; (2) improvement projects, like the beautifying of the home grounds, and (3) experimental projects, like growing small plots of inoculated and uninoculated alfalfa. It is only the third kind which adapts itself as well or better to school grounds than to home conditions, but even this is questionable, due to the usual neglect of school grounds during the holidays.

Projects may be of two kinds: school or group projects and individual projects. Group projects may be of any of the three types mentioned and are conducted while the school is in session for the purpose of demonstrating proper methods of work, and giving skill, but mainly for what may be properly termed outdoor laboratory exercises.

Individual projects, which are conducted on the home plot are preferable because—

(1) In the school garden a great deal of a great many pupils' time is taken up by observation and neither skill nor executive ability can be developed by being a mere spectator;

(2) The individual home project fits in very nicely with a pupil's usual home activities;

(3) Students are able to carry out their projects with the least inconvenience;

(4) They offer an opportunity for individual achievement;

(5) It is under actual home conditions and not specially favourable or adverse (as the case may be) school conditions, that gardening is carried on;

(6) There is no reason why students should not visit each other's projects and learn thereby;

(7) It forms the ideal contact between formal education as represented by the school and practical life as represented by the home.

Conclusion

Wherever properly conducted and looked after both during session and holidays, school gardens are of great educational importance, but Saizman's statement: "School gardens have been laid out neither to draw attention of the passers by, nor to give great returns, but to instruct," is as true to-day as it was in the middle of the 18th Century.

On the other hand, home projects have as much or more educational value as school gardens and in the majority of cases can be made to suit local conditions. It is pre-eminently a matter of applying scientific methods to home conditions, and to quote Huxley's favourite definition of science, which applies equally to home projects, "it is organized common sense."

THE SCHOOL GARDEN, WHERE?

BY FRED W. BATES, B.A., M.Sc., DIRECTOR OF SCHOOL AGRICULTURE, SASKATCHEWAN

THE value of the garden as a definite phase of elementary school activity has been established beyond a doubt, but there is still room for discussion as to the form it should take in the various grades and where it should be located. Certain well defined principles are now generally accepted. The school garden is an educational, not a commercial project. It is a laboratory for the Nature Study and Agriculture of the school where control of natural processes may be observed at first hand and the inter-relationship of plant, insect and animal life noted. It should not be so large as to become burdensome, nor so small as to be trivial. The size of the garden and the character of the work must vary with the age and grade of the pupil. In Saskatchewan when the project is con-

ducted under the direction of the school it is regarded as a school garden whether located on the school ground or elsewhere.

In the lower grades, accessibility is a determining factor and the garden should be on the school grounds or close thereto. On the other hand, in the upper grades, the character of the work is the most important factor, hence the garden should be placed where every condition will be most favourable to success. After trial for a number of years, we are convinced that in this province at least the most favourable place is at the home of the child. We are therefore developing as rapidly as we can the directed home garden for the older pupils and already find it one of the most popular and successful phases of our Boys' and Girls' projects.

PART IV

Special Contributions, Reports of Agricultural Organizations, Publications and Notes

RURAL CREDITS IN CANADA

AN interesting and instructive article on rural credits in Canada, by W. T. Jackman, Professor of Economics in the University of Toronto, was published recently in the *International Review of Agricultural Economics*. Professor Jackman was Chairman of the Commission appointed by the Ontario Government to investigate the problem of rural credits, and his special knowledge of the subject makes his article an authoritative one.

The following is a summary of Professor Jackman's article which he introduces in these words: "In the development of agriculture in Canada, a country which is predominantly agricultural, the same tendencies have been manifested as in most other countries; and as agriculture is becoming rapidly a business, involving the application of business principles and practices, it is necessary to provide for those engaged in it such facilities for borrowing as will enable them to have their credit requirements satisfied according to their needs. In all countries it is recognized that the commercial banking systems are not adapted to the special conditions of agriculture and, consequently, there have come into operation institutions for meeting these requirements for rural credit."

Manitoba.—The Rural Credits Act, 1917, with amendments, makes provision for the organization by farmers of rural credit societies through which they may obtain short term loans for productive purposes. Before commencing business the society must receive subscriptions to

its capital stock from at least thirty-five persons actually engaged or agreeing to engage within one year in farming operations. Each member must subscribe for at least one share of stock and at least 10 per cent must be paid on all stock subscriptions before the society begins business. The Provincial Government and the municipality may subscribe each for one-half as much stock as the aggregate of the individual subscribers. The board of directors of a society is composed of nine members of which the secretary-treasurer is the only one paid.

Any member desiring a loan makes application to the secretary, stating the purpose of the loan and submitting a statement of his assets and liabilities. If his application is approved he is granted a line of credit for a year, and all the personal property he acquires through the proceeds of the loan is subject to a lien in favour of the society. The lender of the money has also the guarantee of the society. The rate of interest payable by the borrower must not exceed 7 per cent per annum.

The returns received from the investment of the paid up capital of the society, together with the society's share of the interest paid by its borrowers, must be used to pay necessary expenses, after which a dividend not to exceed 6 per cent per annum may be disbursed on the paid-up stock and the remainder transferred to a reserve fund.

Until March, 1920, the banks furnished the loans at 6 per cent, but when they decided to raise the interest to 6½

per cent the societies refused their demand. Legislation was then passed establishing the Provincial Savings Office which accepts deposits from all sources and pays 4 per cent interest. This system was inaugurated in July, 1920, and in March, 1921, the net amount of savings was over \$2,000,000, so that its funds were expected to be sufficient to meet demands for loans.

Long-term or mortgage credit is provided in Manitoba through an Act passed in 1917 which created the Manitoba Farm Loans Association to act as the loaning agent between the Government and the farmers. The association is managed by a board of five members. The capital stock, \$1,000,000, is divided into 200,000 shares of \$5 each which can be owned only by borrowers and the Government of the province. Every borrower must subscribe and pay cash for shares to the extent of 5 per cent of the amount of his loan, and when the loan is paid back the borrower's shares are surrendered and paid off at par. All loans made by the association must be secured by a first mortgage and must be repaid on the amortization plan. All mortgages are taken for a thirty-year period, but a loan may be paid off at any annual payment date at or after the end of five years from the date of the mortgage. Loans must not be for more than \$10,000, must not exceed 50 per cent of the value of the property mortgaged, and are made only for purposes specified in the Act. Funds for the loans were obtained by a contribution from the Provincial Treasury. In addition the Board may sell 5 per cent bonds up to 90 per cent of its first mortgages.

Saskatchewan.—There has been no legislation for the establishment of short-term credit in Saskatchewan. An Act passed in 1917 provides for long-term credits. It is practically similar to the Manitoba Act, the chief differences being: (1) No maximum was stated for any individual loan; (2) All

the money for the board's purposes was to be provided by the Provincial Treasurer; (3) The first mortgages received by the board were to be handed over to the Provincial Treasurer as security for the loans.

Alberta.—Under the Live Stock Encouragement Act five or more farmers may form an association and apply to the Government for a loan to be used in purchasing cows and heifers, and, if desired, the joint purchase of a pure-bred bull, which must not cost more than 10 per cent of the loan. Each member of the association may borrow up to \$500. The money is borrowed on the joint and several notes of the members, guaranteed by the Government.

Short-term credit is provided by the Co-operative Credit Act, 1917, which is very similar to the Rural Credits Act of Manitoba described above. The chief difference is that according to the Alberta Act the rate of interest to be paid by the borrower is not a fixed rate paid by all borrowers, but is decided by agreement between the society and the bank as lender.

In 1917 the Alberta Farm Loan Act, resembling the Manitoba Act except in minor details, was passed. It has not been put into operation.

British Columbia.—Under the Land Settlement and Development Act, 1917, the Land Settlement Board has been constituted. It receives advances from the Provincial Treasurer. The Board grants loans on the security of first mortgages, for any purpose which will maintain or increase agriculture or pastoral production. The minimum loan is \$250 and the maximum \$10,000, and must not be for more than 60 per cent of the value of the property mortgaged. The rate of interest on loans is arranged as nearly as possible by adding not over 1½ per cent to the rate paid by the Government.

Two kinds of loans are made under this Act: long-dated loans, extending for 15, 20 or 25 years, repayable on the

amortization principle, and short-dated loans, for not less than 3 or more than 10 years, repayable on such terms as the Board may think fit. A short-term loan must not exceed \$5,000 except in special cases.

The Board has also the power to accept Crown lands or to buy land from private owners and develop it for agricultural purposes. It may establish "settlement areas" in undeveloped parts of the province. Finally, the Board is to take over the functions exercised by the Agricultural Credit Commission appointed under the Agricultural Act, 1915.

Ontario.—In 1916 an Act was passed authorizing loans to settlers in the newer portions of the province. The maximum amount loaned to any settler is \$500 and the rate of interest is 6 per cent. The loan is registered and constitutes a lien against the land. The Co-operative Marketing Loan Act, passed in 1920, authorizes loans to co-operative associations engaged in cleaning, storing, and marketing seed and potatoes. The loan must not exceed \$3,000 and must not be more than 50 per cent of the value of the property on which it is made. It is to be free of interest for two years and after that 6 per cent interest must be paid. At least 50 per cent must be repaid within five years, and the other 50 per cent within ten years from the date of the loan.

In 1920 the Government appointed a commission to investigate the problems of short-term and long-term credits. The report of the Commission was presented on October 15, 1920. An outline of its recommendations are given in Professor Jackman's article.

In April, 1921, the Agricultural Development Act and the Farm Loans Act were passed providing for the granting of long-term and short-term loans. The system for granting short-term loans is practically the same as that of Manitoba. The provision for

long-term loans is virtually a duplication of that of the Manitoba Farm Loans System, except that (1) the Manitoba Farm Loans Association is replaced by an Agricultural Development Board of three members, (2) the Board will loan, under favourable conditions, up to 65 per cent of the value of the land and buildings, and (3) loans shall not be made for less than three or more than twenty years. In order to secure funds, the provincial treasurer is authorized to open offices in the province to receive deposits from any persons or corporations, and to pay interest on such deposits not exceeding 4 per cent.

Quebec.—The *Caisse Populaires*, organized under the Quebec Syndicates Act, provide assistance to farmers and others in the way of both short-term and long-term loans. Each of these banks is a separate entity and operates in a restricted locality. The loanable funds of a bank are obtained by receiving the deposits of the people in that section and by the sale of its shares. The value of each share is usually \$5 and is payable in small instalments of a few cents each. The system is voluntary and members may withdraw their holdings at any time. The social importance of the system, especially in encouraging thrift, is made a paramount feature. Loans, if of small amounts, are made on the security of promissory notes, but all other loans are based on first mortgages. The larger proportion of the loans are from \$5 to \$200. Repayment is monthly. At least 10 per cent of the net profits is annually set aside as a reserve fund. Dividends may be paid to shareholders in proportion to the amount of fully-paid shares held.

New Brunswick.—"An Act to Encourage the Settlement of Farm Lands" was passed in 1912. Under it a board of three members is appointed to buy farms and resell them at cost to

settlers, and to administer a Government fund for this purpose. A catalogue of suitable farms is kept, and the settler is helped to make a choice. If the price to be paid for the property is less than \$1,000 the purchaser must pay down 25 per cent; if the price is over that amount he must make an initial payment of 35 per cent. The balance, with interest at 5 per cent, is paid according to agreement, but the final payment must be made within ten years, except when the term is extended two more years by the Board.

In 1918 "An Act to Provide for the Purchase of Sheep" was passed, authorizing the Government to purchase breeding sheep and resell them to farmers in the province at cost.

Nova Scotia.—No provision has been made for short-term credits, but for mortgage credit "An Act for the Encouragement of Settlers on Farm Lands" was passed in 1912. The settler who wishes to borrow must have cash capital equal to 20 per cent of the appraised or purchase value of the land, besides what he would require for house furnishings, stock, etc. The loan may amount to 40 per cent, of the value of the property, and in approved cases to 80 per cent. The loan may be for as long as 30 years, with repayment on the amortization plan. The mortgagor may pay off his indebtedness at any time within the period. The rate of interest varies from 6 to 7 per cent.

PROTECT THE BIRDS

BY L. STEVENSON, B.S.A.

OF what use in nature is this host of winged creatures that with the changing seasons sweeps over our land and sea? Birds are the most useful allies of man. If it were not for the work of birds in keeping insects in control, life would be intolerable and very hard for human beings and animals. If we remove the birds the insects would increase so rapidly as to destroy the food crops and vegetation of the country. The great increase in insect pests during the past twenty years has been directly due to the destruction of birds by man and his devices. Man has been the most destructive agent of bird life. In the past century many who are living to-day recollect the flights of passenger pigeons that obscured the sky, or remember seeing great flocks of partridges, quail, prairie chicken, and water fowl. Many birds common to our country fifty years ago are almost extinct now. The wild turkey, the snow goose and the passenger pigeon are gone, and many other food birds are becoming rarer each year. The smaller bird such as

the robin, swallow, sparrow, and woodpeckers are becoming fewer and fewer each year, so much so that there are not sufficient to control the insects on which birds generally feed.

To effectually protect birds one must first understand the causes for the apparent decrease in numbers. Few wild birds die of old age or disease. The main causes of bird decrease is lack of food, the severity of climate, attacks of their enemies, and destruction of their nesting places and young.

During March of this year many migratory birds appeared before the settled warm weather came. These were subjected to wind and snowstorm, were forced to hunt for food during rough weather at a time when there is but little food. Numerous of these early migrants perished from cold and starvation. Food would have saved them. Now that man has destroyed the feeding grounds, with their fruitful wild berry bushes, weed seed patches and other bird food producing vegetation, there is but one thing for man to do, and that is

supply foods suitable and attractive to the early visitors, to protect them from storms, ignorant people, and stray cats and dogs. This can be done by building a small shelter in the back yard tree, and keeping a supply of bird foods, such as hemp seed, strips of pork rind, suet, dried berries, small seed of various kinds, broken grain, and apples. The planting of berry producing and seed producing bushes and trees in the door yard or field is a great aid to bird life. With the clearing of land for farm and building purposes the natural home of birds is destroyed, nesting trees and food trees are cut down and burned. Birds will not breed, if there is no nesting place. The best trees and shrubs to plant are those that offer resistance to cats and predatory boys. Thorn trees, thimble berry, wild rose bushes, mountain ash, Virginia creeper, mulberry, black cherry, flowering dogwood, red cedar, common juniper, and staghorn sumac, are all very desirable bird trees and shrubs. By supplying protection, birds are induced to stay in a locality, nest, and increase in numbers sufficient to destroy the insects, and the weed seeds on which they feed. The common practice of burning over grass areas during the spring season destroys thousands of bird nests in the vicinity of Toronto each year. This burning up of nests and young birds practised by thoughtless people should be prevented by law. It is treating the bird much as a human being is abused when his home is burned and his food crop destroyed.

The common pet cat generally succeeds in killing all the birds within its range. One cat in each block of residential property will keep the bird population down to vanishing point. Banish the cats, both stray, pet, and exhibition

that birds may live and continue to do their work. Cats destroy more bird life than all other animal enemies combined. Feeding places safe from cats can be erected above ground, or enclosures of wire netting can be made in which birds can feed in safety. The wire netting should be open enough to permit the free passage of the birds and small enough to keep out cats. A few shrubs or brush placed around such an enclosure makes it more attractive to the birds.

Providing suitable nesting boxes is a splendid practice in bird protection. The nearer the nest box is an imitation of nature, the more useful it will be. Birds like the swifts and swallows which frequent buildings will nest in the fancy structures resembling miniature houses. Woodpeckers, wrens and blue birds require an entirely different type of nesting place, so does the robin and the oriole. Study the birds that you desire to serve and prepare the nest box being guided by nature. Birds are attracted by food in the same way that any other creature is attracted. Plant sunflowers and japanese millet in the back yard, or set apart a portion of the garden for the growing of feed for the small birds that work for you protecting your food crops and your homes from insects during the entire season. Build a bird shelf outside a window of your house. You need the pleasure and community of interest to be had in thus catering to the wants of birds. Teach the children to watch for and feed them, and thus benefit both the child and the bird. A few chickadees or grosbeaks, or nuthatches or downy woodpeckers kept about the house during the winter give pleasure to all, and every rural home can have such if protection and food are supplied.

THE AGRICULTURAL GAZETTE OF CANADA

BEES MAY NO LONGER BE IMPORTED FROM EUROPE

According to an order of the Dominion Minister of Agriculture, dated April 22, 1922, the importation into Canada of bees, used or second hand hives, or raw hive goods or products, excepting

honey and wax, from the continent of Europe, is prohibited on and after the first day of May, 1922. This restriction is necessary owing to the danger of introducing a contagious disease of bees known as "Isle of Wight" disease.

EXPORT FEE FOR FOXES

Export of foxes to the United States involves an examination of each fox and a certificate by one of the Veterinary Pathologists of the Health of Animals

Branch, Department of Agriculture.

A fee of \$5 will be required for each fox examined and certified for export.

NEWS ITEMS AND NOTES

According to a statement made in the House by the Dominion Minister of Agriculture, Honourable W. R. Motherwell, the Seed Grain Purchasing Commission, by storing an extra supply of Western Canada oats, has been able to provide over 300,000 bushels of seed oats for the Maritime Provinces and places east of Ottawa this year. The Minister said that but for this supply becoming available, he did not know where the much required seed oats would have been obtained. Mr. Motherwell intimated that the Seed Purchasing Commission, which, it might be remarked, has proved self-supporting, would continue its activities.

In connection with the regulation of the Dominion Minister of Agriculture prohibiting the importation of bees from Europe for fear of introducing the "Isle of Wight" disease, it may be stated that, according to British investigations, this is one of the most serious diseases known to bee culture. When once firmly established, it quickly exterminates a colony. For many years its cause was unknown. Studies by Doctors Rennie and White and Elsie J. Harvey of Great Britain, discovered the primary cause to be a parasite or a "mite," *Iarsonemus Woodi*. The parasite is said to attack the bees through the breathing orifices, and, in well established cases of infection, to extend inward on either side from the thoracic spiracle.

It appears that the parasite may be found in apparently normal or healthy bees. Bees carrying mites will go to the fields and function apparently as well as healthy bees, but as the parasite begins to develop, the first symptom in their "host" or victim is inability to fly, although apparently normal in other respects. After a time it joins other affected bees in front of the entrance to the hive, and there dies. It is confidently expected that the embargo against the importation of bees from European countries into Canada, now in effect, will prevent this serious malady from reaching this country.

The Dominion Minister of Agriculture has restored the privilege of having seed tested at the government laboratories free of charge to the extent of ten samples from each applicant. This free privilege covers a period extending from the first day of May in one year to the last day of January in the succeeding year. During the months of February, March and April a fee of fifty cents for each test will continue to be made owing to the congestion that usually occurs at that period due to the testing of trade samples, and samples submitted by seed inspectors under the Seed Control Act.

Laboratories for seed investigation, conducted by the Seed Branch of the Dominion Department of Agriculture, are established at Ottawa, Winnipeg and Calgary, but there

are also district inspectors having headquarters at Truro, N.S., for the Maritime Provinces, at Quebec city for Quebec Province, and at Toronto for Western Ontario; Ottawa serves for Eastern Ontario, Winnipeg for Manitoba and Saskatchewan, and Calgary for Alberta and British Columbia.

The Canadian Representatives at the International Conference of World Agriculturists held at Rome in May last were, Dr. A. T. Charron, M.A., D.Sc., Chief Chemist and Director of the Dairy School of the Province of Quebec at St. Hyacinthe, Quebec, and W. E. Wilson, formerly Provincial Dairy Commissioner for the Province of Saskatchewan.

The conference, which comprises delegates from some sixty countries adhering to the International Institute of Agriculture, meets every second year in convention to discuss agricultural problems and devise means for their solution.

The progress that is being made in the accrediting of dairy herds is evidenced by the fact that in less than two years since the work was begun, 250 herds have been tested. Speaking at a gathering of stockmen recently, the Deputy Minister of Agriculture, Dr. Grisdale, gave it as his opinion that in a comparatively short time every herd of any consequence in the country would be on the accredited list.

The Dairy and Cold Storage Commissioner, Mr. J. A. Ruddick, states that much unwarranted prejudice exists in the public mind towards cold storage. If the quality of certain food appears to have deteriorated, there is frequently a declaration that it has suffered from cold storage. Of course there may be some reason in the supposition, but experiments have abundantly proven that if a substance is placed in cold storage in a fit and wholesome condition, provided the temperature is kept right, it will remain in that condition for a great length of time.

Cold storage in a commercial way leads to and maintains a well-balanced state of supply. It enables unseasonable goods to be placed on the table in seasonable condition. It permits goods to be shipped for long distances. It enables districts that cannot produce certain lines of food to enjoy the lines produced in other and possibly far off districts and climes. In short cold storage has become indispensable to modern life, and while it may at times lend itself to certain abuses, these are not such as cannot be regulated.

While in other countries cold storage on a large scale had years before become a recognized factor in the meat business, it was not until 1894 that the first warehouse with mechanical refrigerating machinery was

established in Canada. This occurred in Montreal, and gave an immense impetus to the system. Prior to that there were a few small warehouses in which the cooling process was confined to gathered ice, and where the storage was of a very limited nature. A quarter of a century later, or in 1919, according to data furnished by the Commissioner Ruddick, there had been 266 installations of mechanical refrigeration in cold storage warehouses, abattoirs and other manufacturing establishments; 9 warehouses equipped with the gravity brine system, and 47 small freezers, mostly for fish, where ice and salt were used as a refrigerant; altogether a total refrigerating space of 33,247,774 cubic feet. During the past two years further additions have been made, and now Montreal through its harbour commission, has on the verge of completion the largest, best equipped, and most up-to-date cold storage warehouse extant.

A bulletin entitled "Bran, Shorts, Middlings, and Feed Flour," recently issued by the Department of Agriculture, Ottawa, will be of considerable interest to farmers and stock raisers who require to purchase milling by-products. The publication referred to has been based on investigations resulting from recent demands on the part of many Canadian live stock associations for feeds of a more uniform and higher standard, as well as of greater suitability, especially for the feeding of young stock. These demands were particularly in connection with feeds composed of wheat by-products. In order to better determine the direction the investigation should take, joint meetings were held of millers' associations and representatives from the Seed Branch and the Experimental Farms Branch of the Dominion Department of Agriculture. Many samples were carefully examined by the Division of Chemistry and the Seed Branch, and the outcome of this work and the recommendations based thereon are included in the bulletin.

It is expected that the Argentine will become an increasingly large exporter of dairy products. Previous to 1914 the surplus of butter for export from that country was never more than about ten million pounds annually, the major portion going to the United Kingdom. In 1916, exports began to increase, and during the eleven months ended November 30, 1921, 41,518,512 pounds of Argentine butter were received into the United Kingdom. Considerable quantities were also shipped to other countries, including Canada. It was considered probable that the exports of butter from that country might revert to pre-war quantities after the stimulus of high prices had disappeared, but information

received by the Department of Trade and Commerce is to the effect that exports are likely to be maintained or even increased this year.

On April 21, 1922, the Destructive Insect and Pest Act Advisory Board was constituted by Order in Council. The present members are: Mr. Arthur Gibson, Dominion Entomologist, Chairman; Mr. E. S. Archibald, Director of the Experimental Farms, Vice-Chairman; Dr. J. H. Grisdale, Deputy Minister of Agriculture, Dr. H. T. Gussow, Dominion Botanist, and Mr. L. S. McLaine, Chief, Division of Foreign Pests Suppression, Secretary. The Board will supervise the carrying out of the regulations under the Destructive Insect and Pest Act, and will also recommend from time to time such changes or additions to the regulations as may be deemed necessary.

The Dominion Entomologist reports the opening of the European Corn Borer Laboratory at Port Stanley for the summer. Investigations will be continued on the life history and control of the pest. Reports received indicate that during the past winter the mortality rate of the hibernating larvæ did not exceed eight per cent. An extensive experiment, which includes a number of farms, on the control of this insect is being carried on.

Two crews of eighteen men each are now working on Pike Mountain and in the Voght valley on the Bark Beetle control work in British Columbia. A third crew has been established on the Coutlee plateau.

The Brown Tail Moth work in Nova Scotia was completed for the season on March 31. A total of 979 nests were collected during the winter as compared with 530 collected during the preceding year.

A meeting of the Northwest International Committee of Farm Pests was held at Minot, N.D., on April 11 and 12. A number of important problems were discussed relating to insects of international importance, such as Grasshoppers, the Pale Western Cutworm, and the Wheat Stem Sawfly, with a view to arriving at definite conclusions. The Committee decided to carry out a number of uniform experiments and appointed sub-committees to arrange the details. It was decided to hold the 1923 meeting at Winnipeg, Man. Mr. Criddle was re-elected Chairman and Mr. Mitchener of the Manitoba Agricultural College, Secretary.

A temporary laboratory for the investigation of the mosquito has been established at Banff, Alta., where Mr. Eric Hearle, who for some time past has been studying the problem, will have his headquarters.

Co-workers and friends on the staff of the Experimental Farms Branch made a suitable presentation to Dr. Chas. E. Saunders on the eve of his retirement after twenty years of service.

Mr. C. W. Baxter, who resigned recently as Director of the Dominion Fruit Branch to engage in commercial work, was the recipient of a handsome silver tea service presented by his staff as a token of remembrance and good will.

An arrangement whereby the horticultural work of the Ontario Department of Agriculture will be consolidated at the Ontario Agricultural College, Guelph, has recently been announced. The consolidation will embrace the Fruit Branch, the vegetable specialist's work, the Vineland experimental station, and the College horticultural department. The staff at Vineland and other places will interchange with the horticultural officials at Guelph, and vice versa, for lecturing and research purposes, and the findings from experiments conducted at various places will be co-ordinated. In this way much overlapping, it is hoped, will be averted and the work improved generally.

On May 11 and 13 the Ontario Department of Agriculture broadcasted two lectures by radio telephony to farmers and others within a radius of 150 miles of Toronto. The first address to be sent was given by the Hon. Manning Doherty, Minister of Agriculture, and the second by Mr. L. Stevenson, Secretary and Supervising Director. It is believed that this was the first occasion on which radio telephony was employed in Canada by a government department or institution for the distribution of information of special interest to farmers. The possibilities of assisting the farming community through official radio publicity are great, and their recognition by the Ontario Department marks the opening of a new era.

The closing exercises of the Ontario Veterinary College were held on Thursday, April 29. The chair was occupied by Principal C. D. McGilvray. The degree of Bachelor of Veterinary Science, which is conferred by the University of Toronto, was granted to six graduating students. The present graduating class holds the unique position of being the last to graduate from the College at Toronto owing to the fact that the institution is being removed to Guelph.

Mr. A. T. Charron, formerly Assistant Dominion Chemist and now Superintendent of the Provincial Dairy School, has been selected to represent Canadian chemists at the International Convention of Chemists to be held this summer at Lyon, France.

The Commission of Agricultural Merit of the Province of Quebec met recently to discuss plans for increasing the interest taken in the Agricultural Merit competitions.

The Quebec government has granted a diploma of Very High Special Merit in the Order of Agricultural Merit to Mr. Auguste Dupuis, fruit grower of Village-des-Aulnaies. Mr. Dupuis is the second person in the province to receive the title under the law passed in 1920. During his career he has served the public in a number of capacities. In 1880 he was appointed Dominion commissioner of the Jamaica exposition. In 1900 he was made secretary of the Canadian Commission at the World's Fair, Paris, France, and later was entrusted with similar duties at the St. Louis exposition, St. Louis, Mo. At the present time Mr. Dupuis is one of the directors of the Pomological Association of the province, and is chief director of the fruit growing stations. From 1907 to 1921 he was a member of the Council of Agriculture.

The same distinction was at the time granted to Dr. J. C. Chapais, who has long been prominent in connection with agricultural affairs in the province. Dr. Chapais was one of the editors of the *Journal d'Agriculture*, and for a number of years lectured and wrote on agricultural topics, being the author of several pamphlets and also of work on forestry. He is assistant commissioner of dairying in Quebec; assistant commissioner for that province under the Agricultural Instruction Act; has acted as president of the Fruit Growing and Pomological Association, and was secretary of the first Forestry Association in the province. In 1919 a degree of Doctor of Agriculture was conferred on him by the Laval University.

Mr. George Bouchard, M.P., was recently appointed a member of the Council of Agriculture for the province of Quebec. Mr. Bouchard, who is Professor of Botany and Zoology at the College of Agriculture, Ste. Anne de la Pocatiere, has been active for a number of years in agricultural circles in the province of Quebec as a writer, lecturer and organizer. In 1922 he visited the Canadian West, in company with a professor of Oka and Dr. A. T. Charron, and reported to the provincial Minister of Agriculture on the organization of agricultural teaching in the other provinces of Canada.

At the closing exercises of the Manitoba Agricultural College the announcement was made that a roll of honour of persons who have distinguished themselves in the development of agriculture in Manitoba was being compiled, and that pictures of those included in the roll will be hung in the halls of the Agricultural College buildings. Illuminated

addresses were presented by R. M. Matheson, Brandon, to the first four to be placed on the roll, following their introduction by President John Bracken. The recipients were: Dr. S. A. Bedford, Weeds Commissioner, who was commended for wise and sympathetic leadership in the early days of agriculture; A. P. Stevenson, fruit grower of Morden; Gen. Hugh N. Dyer, Minnedosa, for contribution to agricultural education, and J. W. Scallion, Virden, for organization work among farmers of the province.

The farm survey organized by the Animal Husbandry Department of the University of British Columbia in 1920 will be continued this year. The cost is being met by the Agricultural Instruction grant and the work will be continued for a period of years. It is the intention to definitely establish, among other things, the reasons why some farmers fail and others succeed under circumstances that are exactly similar. Deductions indicate that the matter of management is often the determining factor. Surveys of this nature are regarded by the College of Agriculture as a necessary basis for teaching and extension work.

A scholarship in Horticulture has been established at the University of British Columbia by the British Columbia Fruit Growers' Association. The scholarship has an annual value of \$100, and is awarded to the student in horticulture attaining the highest rank in the entire work of the third year and will take the fourth year in this subject. Last year no award was made. This year two men have qualified and will each receive a scholarship.

The animal husbandry students at Macdonald College successfully conducted a Live Stock Show and Sale of their own, on the lines of the "Little Nationals," featured during the past few years at some of the American colleges. The event took the form of a sale in the morning and a show in the afternoon.

The Superintendent of Elementary Agricultural Education reports an increase in home project work this year in the Province of New Brunswick. Three thousand more packages of seed, including potatoes, have been distributed than in 1921. Eggs distributed for poultry projects increased from 1,000 to 1,260 settings.

Two Live Stock Improvement Trains were operated in the Province of Manitoba during May. Cattle and hogs were featured and pure bred bulls were carried for sale. Other features were a lecture car for women and one for boys and girls.

THE AGRICULTURAL GAZETTE OF CANADA

An Agricultural Instruction Train to tour the Province of Quebec is being organized. The train will be furnished and operated by the Canadian Pacific Railway, while the equipment and live stock will be provided jointly by the Provincial Department of Agriculture and Macdonald College.

The extension department of the Saskatchewan College of Agriculture conducted ninety-nine local short courses in agriculture during the winter months each lasting from one to three days. Educational films were shown at the evening lectures. The total attendance was 18,877, the average per meeting being 74.

An important conference was held recently in Saskatchewan between representatives of the produce dealers, freight and express agents, the Retail Merchants' Association, and the Poultry Breeders' Association for the purpose of discussing the handling of eggs and the means whereby loss in shipping might be reduced.

Ninety Boys' and Girls' Club demonstration teams have been organized in Manitoba this year. Some 38 different subjects are being treated.

The agricultural schools at Gleichen and Youngstown, Alberta, have been temporarily closed. The attendance at these schools is the smallest of any of the six farm schools in the province. The teachers will be placed in other schools and the pupils given free transportation to the nearest school.

The College of Agriculture of the University of Alberta held its first annual Live Stock Feeders' Day in April last. It is intended to make this gathering an annual event, with the object of placing the results of the feeding tests conducted by the department of Animal Husbandry directly before farmers engaged in the feeding of live stock.

In 1920 the Dominion Bureau of Statistics commenced the annual collection of returns from fur traders, and for the season 1920-21 the value of pelts purchased from trappers and fur farmers was \$10,151,594. In 1921 the value of raw furs exported was \$11,711,981.

As settlement has extended, the numbers of wild fur-bearing animals have decreased, and this has led to the breeding of fur-bearing animals in captivity. Success has already been attained in the raising of the fox, mink, skunk and raccoon. Experiments are being made with the marten, fisher, beaver, muskrat, and opossum. Karakul sheep, from the young of which is obtained the valuable fur known as Persian lamb, are also being successfully raised in Canada. The total value of pelts sold from fur farms

in Canada in 1920 was \$388,335, comprising \$373,140 for silver fox pelts, \$11,111 for patch fox, \$3,349 for red fox, and \$735 for mink. The value of live animals sold from fur farms in the same year was \$763,221, comprising—\$750,123 for silver foxes, \$12,095 for patch foxes, \$818 for red foxes, \$150 for mink and \$35 for raccoons. The value of live foxes exported from Canada in 1921 was \$277,182.

Fur trading led to the early colonization of Canada. The first explorers returning to the old world carried with them the pelts of fur-bearing animals obtained from Indian trappers, and the desire to gain control of this trade led to the formation of companies and associations which, in return for certain privileges in connection with the trade, agreed to promote colonization in the new country. The first company chartered to trade in furs was formed by a number of merchants of France in 1603. The first trading post was established at Hochelaga in 1611. Exploration of the northern and western parts of Canada showed that the territory abounded in wild life, and in 1670 an English company—the Hudson's Bay Company—was chartered to trade in furs, and built its first trading post on Hudson Bay. Other posts were soon erected and their establishment was continued until their locations extended from the Atlantic to the Pacific. The first Canadian company to trade in furs was formed by a number of Montreal merchants in 1783. In 1821 all fur trading companies of British North America were united under the Hudson's Bay Company.

Raw furs are the chief commercial product of the wild life of Canada, and as such represent the only economic return from hundreds of thousands of square miles, constituting perhaps half the area of the Dominion.

On the basis of present statistics it would appear that fully 60% of our total hog production is consumed in Canada, the other 40% being exported. If 22% of our hogs are of select bacon type it follows that 45 to 50% of our exports of bacon are the product of off-type bacon hogs, without allowing for the fact that the entire 60% of the pork used in Canada is not entirely of off-type bacon hogs. The Canadian trade is undoubtedly supplied with a percentage of pork from bacon hogs so that the percentage of low grade Wiltshires exported is well over 50% of the total. This largely accounts for the fact that during 1921 and up to the present time there has been a spread of 30 shillings per long hundred between Canadian and Danish bacon.

Attention is drawn to a bulletin entitled, *Success in Prairie Tree Planting*, issued by

the Forestry Branch of the Department of the Interior. This publication presents the results of the co-operative tree planting plan, established about twenty years ago by the Dominion Government in order to assist prairie farmers in protecting their farm buildings and gardens by shelter-belts of those kinds of trees which tests have proved to be suitable. The stopping of soil drifting by wind-breaks is also dealt with. An estimate is made of the cash value of the sixty million trees sent out from the Dominion Government nursery stations, but the greater value is found in the increased comfort and homelike surroundings of prairie homesteads since the plan was inaugurated. In the pamphlet forty farmers, scattered over the prairies from Winnipeg to Calgary, tell of their success under the plan. While the free distribution of trees under this system is confined to the Prairie Provinces, the work affects the whole of Canada both because improved conditions in one part must benefit all Canada, and because it shows that if trees of valuable kinds can be got to grow in what was once considered a treeless region, a great opportunity exists for improving forest conditions and in growing timber in all parts of Canada.

The production of apples in the United States in 1919, according to the Fourteenth Census, was 136,746,154 bushels, as compared with 145,412,318 bushels in 1909, representing a decrease of 8,666,164 bushels, or 6 per cent. The average production per tree was 1.2 bushels in 1919, as compared with 1 bushel in 1909.

The number of apple trees of bearing age in 1920 was 115,265,029, as compared with 151,322,840 in 1910, representing a decrease of 36,057,811 trees, or 23.8 per cent.

The number of apple trees not of bearing age reported for 1920 was 36,171,604, as compared with 65,791,848 in 1910. These figures indicate a decrease of 29,620,244 trees, or 45 per cent.

The production of peaches in 1919 was 51,551,251 bushels, as against 35,470,276 bushels in 1909. The increase in production between 1909 and 1919 amounted to 16,080,975 bushels, or 45.3 per cent. The average production per tree in 1919 was 0.8 bushel, as compared with 0.4 bushel in 1909.

The number of peach trees of bearing age in 1920 was 65,654,921, as compared with 94,506,657 in 1910, representing a decrease of 28,851,736 trees, or 30.5 per cent.

APPOINTMENTS AND STAFF CHANGES

Mr. C. W. Baxter has resigned as Dominion Fruit Commissioner, to which position he was appointed in November, 1918, to become general manager of the Niagara Peninsula Growers, Limited. Since assuming the duties of Commissioner, Mr. Baxter has been active in securing the adoption of more specific grades for fruit, in the standardization of packages, and in preparing for the compulsory grading of potatoes and onions. Under his direction the inspection and market reporting services have been extended and developed, transportation problems have been given special consideration, and the Canadian Horticultural Council has been organized for the consolidation and general welfare of horticultural and allied interests.

The resignation is announced of Mr. Charles E. Saunders, B.A., Ph.D., LL.D., Dominion Cerealists. Dr. Saunders was appointed in 1903, and since that time has been engaged in breeding and testing wheat, oats and other grains. Dr. Saunders has to his credit the discovery and introduction of Marquis wheat, and the origination of a number of other outstanding varieties. Of Marquis wheat, which was first distributed

in 1909, over three hundred million bushels were produced on this continent in 1918. His more recent introductions include Prelude, Ruby, and Early Red Fife wheats, and the Liberty (hulless) oat.

Mr. J. R. Hastings has resigned the position of District Fruit Inspector for Western Ontario, to become Secretary-Treasurer and Assistant General Manager of the Niagara Peninsula Growers, Limited.

Mr. F. C. Bailey, B.S.A., has been appointed Superintendent of the Dominion Experimental Farm, Fredericton, N.B., to fill the vacancy caused by the resignation of Mr. W. W. Hubbard. Mr. Bailey formerly held the position of Assistant Deputy Minister and afterwards that of Commissioner of Agriculture in the Ontario Department of Agriculture, and more recently that of manager of the Royal Agricultural Winter Fair, from which he resigned in March last.

Mr. Arthur Kelsall has been appointed entomologist at Annapolis Royal, N.S., in place of Mr. George E. Sanders recently resigned.

Veterinary Inspector W. W. Stork is in charge of the Inspection Station at Niagara, Ontario.

Veterinary Inspector W. Moynihan is Acting District Inspector for Ontario.

Mr. Archibald H. McLennan, B.S.A., who for several years has been vegetable and potato specialist in the Department of Agriculture of Ontario, has been appointed to the position of professor of horticulture at the Ontario Agricultural College to succeed Professor J. W. Crow, whose resignation took place recently.

Mr. W. J. Sheppard has been appointed Provincial Apiarist for British Columbia. Mr. Sheppard was an inspector of apiaries for eight years, and for the past three years held the office of Chief Inspector.

OBITUARY

The Health of Animals Branch lost one of the oldest members of its staff by the death, in March last, of Dr. J. A. Couture, D.V.S., after a long and honourable career. Born in 1850, Dr. Couture was one of the first graduates of the Montreal Veterinary College. He entered the Department in 1884, and held the position of Superintendent of the Animal Quarantine Station at Levis, Quebec, where his vigilance prevented on more than one occasion the entry of serious contagious diseases into Canada. Dr. Couture was greatly interested in the improvement of the French-Canadian breeds of horses and cattle, and assisted in securing the establishment of records for those breeds.

NEW PUBLICATIONS

DOMINION DEPARTMENT OF AGRICULTURE

Experimental Farm, Brandon, Man., 1921.—Interim Report of the Superintendent, W. C. McKillican, B.S.A.—Dominion Experimental Farms.

Experimental Station, Charlottetown, P.E.I., 1921.—Interim Report of the Superintendent, J. A. Clark, B.S.A.—Dominion Experimental Farms.

Results of Experiments at Fort Vermilion, Alta.—Bulletin No. 6—New Series. Compiled from the Annual Detailed Reports of the Superintendent, Robert Jones.—Dominion Experimental Farms.

Why and How to Use Cheese.—Pamphlet No. 7—New Series. By Helen G. Campbell, Dairy and Cold Storage Branch.

The Best Varieties of Grain.—Pamphlet No. 11—New Series. By Charles E. Saunders, B.A., Ph.D., LL.D., Dominion Cerealists.

The Strawberry Root Weevil.—With notes on other Insects affecting Strawberries. By W. Downes, Assistant Entomologist, Pamphlet No. 5—New Series.

The Western Wheat-Stem Sawfly and Its Control.—By Norman Criddle, Entomologist in charge for Manitoba. Pamphlet No. 6—New Series.

Field Crop Insects.—By H. F. Hudson, Assistant Entomologist Division of Field Crop and Garden Insects, Entomological Branch. Circular No. 2.

ONTARIO

Agricultural and Experimental Union, 1921.—Forty-third Annual Report.

Twenty-first Annual Report of the Agricultural Societies and of the Convention of the Association of Fairs and Exhibitions, 1921.

Milk Production Costs.—Bulletin 284. By the Ontario Cost of Milk Production Committee.

Addresses on Co-operative Marketing.—By Mr. Aaron Sapiro, San Francisco, California.

The Cabbage Maggot.—Circular No. 40. By L. Caesar, Provincial Entomologist, O.A.C., Guelph.

BRITISH COLUMBIA

British Columbia Dairymen's Association.—Sixteenth Annual Report, 1921.

MISCELLANEOUS

Success in Prairie Tree Planting.—By Norman M. Ross, B.S.A., B.F.—Bulletin No. 72, Forestry Branch, Department of the Interior.

Grain Trade of Canada, 1921.—Report for the Crop Year ended August 31 and to the close of Navigation.

ASSOCIATIONS AND SOCIETIES

Canadian Horticultural Council.—At the organization of the Canadian Horticultural Council, held in Ottawa on May 17, representatives were present of the various associated horticultural interests. A constitution and by-laws were adopted. The objects of the association as set forth in the constitution are to promote the advancement of matters tending towards the improvement of the horticultural and allied industries in Canada, including plant origination and registration, production, grading, packing, transportation, storage, marketing, etc.

The interests concerned are to be represented as follows: Fruit growers 5, vegetable growers 4, wholesale fruit and vegetable dealers 2, and one each for the package manufacturers, florists and gardeners, jam manufacturers, canners, nurserymen, amateur horticulturists, and seedsmen.

As far as possible, all of these representatives shall be appointed by the associations of the industries concerned. The geographical distribution of fruit growers provides for one member each for Nova Scotia; New Brunswick and Prince Edward Island combined; Quebec; Ontario; and one for the Prairie Provinces and British Columbia combined. The vegetable growers' representatives shall be similarly distributed, with the exception that there is but one representative for the three Maritime Provinces.

It was announced at the meeting that the Dominion Government would provide \$5,000 for organization purposes. The funds for future work will be levied on the various industries concerned on the following basis: Representatives of fruit-growers' and vegetable-growers' organizations, 50 cents each. The following interests, as a whole, will each contribute an annual lump sum fee: Package manufacturers, \$500; florists and gardeners, \$200; nurserymen, \$200; wholesale fruit and vegetable dealers, \$1,000; jam manufacturers, \$500; canners, \$500; horticultural associations, \$200; seedsmen, \$200. Any person is entitled to associate membership in the Council by paying an annual fee of \$5.

A resolution was adopted by the Council recommending that the administration of the laws governing the adulteration of jams, fruit beverages, etc., be transferred from the Department of Health to the Department of Agriculture.

The following officers were elected: President, Col. H. L. Roberts, Grimsby, Ont.;

Vice-president, F. W. Bishop, Kentville, N.S.; Second Vice-president, R. R. Scott, Winnipeg, Man. Directors: W. E. Groves, Hamilton Ont.; W. H. Stewart, Aylmer, Que.; Jas. Wagstaffe, Hamilton, Ont.; Chairman of Standing Committee: Publicity, E. B. Luke, Montreal, Que.; Legislation, C. W. Baxter, Fruit Commissioner, Ottawa; Transportation, G. E. McIntosh, Fruit Branch, Ottawa; Plant Registration, W. T. Macoun, Dominion Horticulturist, Ottawa; Secretary-Treasurer, L. F. Burrows, Assistant Fruit Commissioner, Ottawa.

Alberta Shorthorn Breeders' Association.—Hon. President, Hon. George Hoadley, Minister of Agriculture, Edmonton; Hon. Vice-President, R. S. Hamer, Ottawa, Ont.; President, W. L. Carlyle, Calgary; 1st Vice-President, Wm. Sharpe, Lacombe; 2nd Vice-President, H. Wright, Calgary; Secretary-Treasurer, W. A. McMasters, Calgary.

Alberta Clydesdale Horse Breeders' Association.—President, Norman A. Weir, Ohaton; 1st Vice-President, A. Dollar, High River; 2nd Vice-President, Thos. McMillan, Okotoks; Secretary-Treasurer, E. D. Adams, Calgary.

Alberta Horse Breeders' Association.—Hon. President, Hon. George Hoadley, Minister of Agriculture, Edmonton; President, E. D. Adams, Calgary; 1st Vice-President, W. L. Carlyle, Calgary; 2nd Vice-President, Norman A. Weir, Ohaton.

Alberta Swine Breeders' Association.—President, G. F. Herbert, Medicine Hat; 1st Vice-President, W. J. Hoover, Bittern Lake; 2nd Vice-President, F. W. Gardner, Delacour.

Alberta Aberdeen-Angus Breeders' Association.—Hon. President, Professor, A. A. Dowell, Edmonton; President, F. R. Cathro, Calgary; 1st Vice-President, C. H. Richardson, Bowden; 2nd Vice-President, A. E. Noad, Olds; Secretary, C. E. Morrison.

Alberta Technical Agriculturists' Association.—President, D. H. Galbraith, Vulcan; Vice-President, Professor G. Cutler, Edmonton; Secretary, C. E. Bain, Calgary.

British Columbia Stock Breeders' Association.—Hon. Presidents, Hon. S. F. Tolmie, Victoria; Capt. J. C. Dunwaters; President, Alex. Davie, Ladner; Vice-President, Frank L. Ward, Douglas Lake.

Ontario Poultry Producers' Association.—President, Lewis N. Clark, Port Hope; Secretary, George W. Miller, Toronto; Treasurer, E. L. Ruddy, Toronto.

Royal Agricultural Winter Fair.—President, W. A. Dryden, Brooklin, Ont.; Vice-

President, H. C. Cox, Toronto; Secretary-Treasurer, A. P. Westervelt, Toronto.

Eastern Canada Live Stock Union.—President, C. W. Gurney, Paris; Vice-President, S. E. Todd, Toronto; Secretary-Treasurer, J. D. Brien.

THE LIBRARY

LIST OF PRINCIPAL ACCESSIONS TO THE DEPARTMENTAL LIBRARY, INTERNATIONAL INSTITUTE BRANCH, DEPARTMENT OF AGRICULTURE.

Les Coleopteres d'Europe: France et regions voisines, par Professeur C. Houlbert. Paris, Librairie Octave Doin, 1922. Tomes 1-3.

Neighborhood entertainments, by Renee B. Stern. Toronto, Macmillan co. of Canada, 1919. 297 pp. il. (The young farmer's practical library).

Dictionary of botanical equivalents; French-English, German-English, by Ernst Arschwager and E. M. Smiley. Baltimore, Williams & Wilkins co., 1921. 137 pp.

The book of ice cream, by W. W. Fisk. Toronto, Macmillan co. of Canada, 1919. 302 pp. il. (Rural text-book series).

A compendium of food-microscopy with sections on drugs, water, and tobacco, by E. G. Clayton. London, Bailliere, Tindall & Cox, 1909. 431 pp. il.

Horses, asses, zebras, and mules, by W. B. Tegetmeier, and C. L. Sutherland. London, Horace Cox, 1895. 158 pp. il.

The friendly Arctic, by Vilhjalmur Stefansson. Toronto, Macmillan co. of Canada, 1921. 784 pp. il.

Policing the plains, by R. G. Macbeth. Toronto, Hodder & Stoughton, 1922. 320 pp. il.

Selected readings in international trade and tariff problems, by F. W. Taussig. New York, Ginn & co. 1921. 566 pp.

The vitamins, by Casimir Funk. Baltimore, Williams & Wilkins co. 1922. 502 pp. il.

The vitamins, by H. C. Sherman. New York, Chemical catalog co. 1922. 273 pp.

Elements of the science of nutrition, by Graham Lusk. Philadelphia, W. B. Saunders co. 1921. 541 pp. il.

Microscopy of technical products, by T. F. Hanausek, tr. by A. L. Winton. New York, John Wiley & sons, 1907. 471 pp. il.

Insect behavior, by P. G. Howes. Boston, R. G. Badger, 1919. 176 pp. il.

Measuring minds; an examiner's manual to accompany the Myers mental measure, by C. E. Myers and G. C. Myers. New York, Newson & co. 1920. 88 pp. il.

Cyclopedia of farm crops, by L. H. Bailey. Toronto, Macmillan co. of Canada, 1922. 699 pp. il.

The apple tree, by L. H. Bailey. Toronto, Macmillan co. of Canada, 1922. 117 pp. il.

Fruit growing, by B. W. Douglass. Indianapolis, Bobbs-Merrill co. 1922. 357 pp. il.

Farm & garden rule book, by L. H. Bailey. Toronto, Macmillan co. of Canada, 1917. 587 pp. il.

How to know the mosses, by E. M. Dunham. New York, Houghton Mifflin co. 1916. 287 pp. il.

Gardening, by A. B. Stout. Yonkers-on-Hudson, World book co. 1922. 354 pp. il.

The home beautiful. Monroe, Mich. Greening nursery co. 1921. 114 pp. il.

The book of the peony, by Mrs. E. Harding. Philadelphia, Lippincott, 1917. 259 pp. il.

Report of the international potato conference, 1921. London, 1921. 182 pp.

Methods of teaching vocational agriculture in secondary schools, by S. H. Dadisman. Boston, R. G. Badger, 1921. 142 pp. il.

The story of the agricultural club, 1918-1921, by R. H. Rew. London, P. S. King & son, 1922. 205 pp.

Community life and civic problems, by H. C. Hill. Boston, Ginn & co. 1922. 561 pp. il.

Consumers' co-operative societies, by Charles Gide. Manchester, Co-operative union, ltd. 1921. 251 pp.

Elementary community civics, by R. O. Hughes. Boston, Allyn & Bacon, 1922. 475 pp. il.

Fernwood community center, by J. W. Tavenner. Boston, Roxburgh publishing co. 1921. 233 pp.

- An agricultural atlas of Wales*, by J. P. Howell. Prepared for the Institute for research in agricultural economics, Oxford. Southampton, 1921.
- Authors' and printers' dictionary*, by F. H. Collins. New York, Humphrey Milford, 1921. 408 pp.
- The microscope*, by Conrad Beck. London, R. & J. Beck, Ltd. 1921. 144 pp. il.
- Insects and human welfare*, by C. T. Brues. Cambridge, Harvard University press, 1920. 104 pp. il.
- The early embryology of the chick*, by B. M. Patten. Philadelphia, P. Blakiston's son & co. 1920. 167 pp. il.
- Motion pictures for community needs*, by Gladys and Henry Bollman. New York, Henry Holt & co. 1922. 298 pp.
- Experimental cottages*, by W. K. Jaggard. London, H.M. Stationery office, 1921. 77 pp. il.
- Home nursing*, by Sister Matilda. Toronto, Thos. Nelson & sons, 1919. 124 pp. il.
- The psychic life of insects*, by E. L. Bouvier, tr. by L. O. Howard. New York, The Century co. 1922. 377 pp.
- Ramassage et utilisation des déchets et résidus*, by Arturo Bruttini. Rome. Institut international d'agriculture, 1922. 336 pp.
- Hybrides, hybridité, et hybridation dans le règne animal*, par F. X. Lesbre. Lyon, A. Rey, 1921. 87 pp.
- The principles of horticulture*, by W. M. Webb. London, Blackie & son, Ltd. 1907. 136 pp. il.
- Geologie agricole du Departement de l'Oise*, par Pierre Waguët. Beauvais, Institut agricole. 105 pp.
- Country life leadership*, by B. C. Davis, LL.D. Plainfield, N. J. 158 pp.
- Fibres for fabrics*, by A. E. Garrett. London, Hodder & Stoughton, 220 pp. il.
- The home doctoring of goats, rabbits & poultry*, by R. E. Davies. London, Benn bros. Ltd. 1921. 54 pp.
- How to study birds*, by H. K. Job. Toronto, Macmillan co. of Canada, 1922. 272 pp. il.
- The sport of bird study*, by H. K. Job. Toronto, Macmillan co. of Canada, 1922. 312 pp. il.
- Les engrais*, par A. Ch. Girard. France, Librairie agricole de la maison rustique, 1922. 164 pp.
- Farmer's account book*. Dublin, Dept. of agriculture & technical instruction, 1921.
- La race bovine charollaise*, par Jacques Meniaud. Macon, France, 1921. 39 pp. il.
- The Province of Quebec*; geographical and social studies, by J. C. Sutherland. Montreal, Renouf publishing co. 1922. 157 pp.
- Botany, developmental and descriptive*, by W. Mansfield. New York, Lea & Febiger, 1922. 232 pp. il.
- The lychee and lungan*, by G. W. Groff. New York, O. Judd co. 1921. 188 pp. il.
- Gardening with brains*, by H. T. Finck. New York, Harper & bros. 1922. 270 pp.
- The story of the fields*, by J. H. Fabre. Toronto, Hodder & Stoughton Ltd. 271 pp. il.
- Prairie dairying with cow-sense*, by C. E. Thomas. Lloydminster, Sask., 1921. 38 pp.
- Pumping and water power*, by F. A. Bradley. New York, Spon & Chamberlain, 1912. 119 pp. il.
- Cotton & wool*, by J. S. M. Ward. London, William Rider & son, 1921. 270 pp.
- Practical tanning*, by Allen Rogers. New York, H. C. Baird & co. 1922. 699 pp. il.
- Plane surveying*, by J. K. Finch. Chicago, American technical society, 1920. 256 pp. il.
- Modern painters' cyclopedia*, by F. Maire. Chicago, F. J. Drake & co. 1918. 464 pp. il.
- Household textiles*, by C. M. Gibbs. Boston, Whitcomb & Barrows, 1922. 256 pp. il.
- The concrete engineer's handbook*. Scranton, International textbook co. 1922. 368 pp. il.
- A naturalist in the Great Lakes region*, by E. R. Downing. Chicago, University of Chicago press, 1922. 328 pp. il.
- Food and cookery for the sick and convalescent*, by F. M. Farmer. Boston, Little, Brown & co. 1917. 305 pp. il.
- School & home cooking*, by C. G. Greer. Boston, Allyn & Bacon, 1920. 554 pp. il.
- Hope Farm notes*, by H. W. Collingwood. New York, Harcourt, Brace & co. 1921. 234 pp.
- Successful teaching in rural schools*, by M. S. Pittman. New York, American Book co. 1922. 294 pp. il.
- Prairie farmers' poultry book*, by William Osburn. Chicago, Prairie farmer publishing co. 1922. 243 pp. il.
- Farm animals*, by E. W. Wilcox. Garden City, N.Y. Doubleday, Page & Co. 1915. 357 pp. il.

Alimentation rationnelle des animaux domestiques, par Raoul Gouin. Paris, Librairie J. B. Bailliere et fils, 1922. 404 pp.

The minds and manners of wild animals, by W. T. Hornaday. New York, Charles Scribner's sons, 1922. 328 pp. il.

Every step in beekeeping, by B. W. Douglass. Indianapolis, Bobbs-Merrill co. 1921. 177 pp. il.

Heredity and environment in the development of men, by E. W. Conklin. Princeton, University press, 1922. 379 pp. il.

Modern road building and maintenance, by A. P. Anderson. Chicago, Hercules powder co. 146 pp. il.

The "know how" of concreting, by H. C. Campbell. Newhawka, Neb. Sheldon Mfg. co. 1921. 127 pp. il.

Concrete bridges, culverts and sewers, by A. A. Houghton. New York, N. W. Henley publishing co. 1912. 58 pp. il.

The pocket book of refrigeration and ice-making, by A. J. Wallis-Tayler. London, Crosby Lockwood & son, 1919. 215 pp.

Sanitary refrigeration and ice-making, by J. J. Cosgrove. Pittsburgh, Standard sanitary manufacturing co. 1914. 331 pp. il.

Fundamentals in poultry breeding, by J. H. Robinson. Quincy, Ill. Reliable poultry journal publishing co. 1921. 160 pp. il.

Simple farm accounts, by R. E. Willard, Fargo, N.D. 1922. 106 pp.

Chemistry, by M. H. Kessel. New York, Globe book co. 1921. 109 pp. il.

Role des colloides chez les etres vivants, par Auguste Lumiere. Paris, Masson & cie. 1921. 310 pp. il. col. plates. Bibl. pp. 154-283.

Les maladies parasitaires des plantes (infestation—infection) par M. Nicolle et J. Magrou (de l'Institut Pasteur). Paris, Masson & cie. 1922. 199 pp.

The pigeon, by A. V. Meersch. Syracuse, C. C. De Puy, 1907. 64 pp. il.

Les recreations de l'apiculteur, par E. Alphandery. Montfavet, Librairie de vulgarisation apicole, 1921. 205 pp. il.

PART V

The International Institute of Agriculture

FOREIGN AGRICULTURAL INTELLIGENCE

All communications in regard to this section should be addressed to T. K. Doherty, International Institute Commissioner, Department of Agriculture, West Block, Ottawa.

SCIENCE AND PRACTICE OF AGRICULTURE

GENERAL INFORMATION

593.—**Food Ration and Vitamines.**—DES-GREZ, A., and BIERRY, H., in the *Comptes rendus des séances de l'Académie des Sciences*, Vol. 172, No. 17, pp. 1068-1071. Paris, April 25, 1921.

On a previous occasion the authors investigated the specific food requirements of the organism, and basing their experiments on the indispensable factor of nitrogen balance they first inquired within what limits isodynamic nutritive principles could replace one another without injury to the organism, that is to say be physiologically equivalent.

Experiments on rats placed on synthetic diets deficient in vitamines showed that nitrogen equilibrium could be ensured, for a certain time, by fixed proportions of proteins, sugars and fats, in a given ration of sufficient energy value; that the minimum of each of the three elements depends on the chemical structure and the proportion of the two others; and, lastly, that the minimum of nitrogen is reached when a high percentage of a carbo hydrate is present in the ration.

What happens to an animal receiving a well balanced ration when one of the constituent elements of that ration is suppressed, while the percentage of the two others, or of one of them only, is raised in parallel in proportion to the calorific power? This was the question which the authors investigated in the further experiments dealt with in this paper.

Comparing these experiments with those of MacCollum and Davis, Drummond and Hindhede it appears that, on the one hand, with food deprived of fat, containing only albumins and carbohydrates, but rich in vitamines, the growth of the young animal and equilibrium of the adult can be assured, and that, on the other hand, in avitaminosis (lack of vitamines), the nitrogen balance can only be maintained if the constituents of the ration are all present in certain proportions in the diet.

It must, then, be admitted that the quantities of the complimentary factors A (fat soluble), B (water soluble) and C (antiscorbutic) required by the organism, vary not only with the kinds of food, but also with the proportions of these kinds present in the ration; it must equally be admitted that each kind of food exercises a functional role, in the chemical sense of the word, in the intermediate metabolism of the two others.

Already the fact that no substitution can exist between carbo-hydrates and fats, compared with the same albumen, and that the catabolism of certain aminic acids and fatty acids (cetogenic) is regulated by the sugars, indicated the importance of the chemical function and structure of the food. As the splitting-up of the proteins, sugars and fats comprise simultaneous phenomena, giving rise to products reacting on one another, it must be admitted that if, by the contribution of nourishment, these combinations are ensured, the reserves enter little or not at all into action. Different processes probably result, brought into action by the organism; some of which require the more or less essential assistance of vitamines.

CROPS AND CULTIVATION

801.—**The Physical Chemistry of Basic Slag.**—DESCH, C. H., in *The Chemical News*, Vol. 122, No. 3177, pp. 102-103. London, March 11, 1921.

Complete physico-chemical knowledge of basic slag, is still lacking, in spite of the many excellent researches made regarding it. Chemical analysis has, indeed, given the proportions of oxides of the metals and metalloids contained in it, and the sulphur content is also known, but there are many discrepancies regarding the nature of the phosphates and silicates and also, among the minor constituents, regarding that of the sulphides. The fact that perfect crystals have been isolated gives no assurance that they are identical with the ordinary constituents of the mass of the slag or that they

are substances that are mineralogically homogeneous.

The essential constituents of basic slag are the oxides of iron, manganese, calcium, magnesium, silicon and phosphorus, whilst the sulphides of calcium and manganese and the fluoride of calcium should be considered as accessory; a state of oxidation only is considered although the iron may be found both in a ferric and ferrous state.

In basic slags containing more than 40% of lime, the latter is found chiefly in the form of orthosilicate (Ca_2SiO_4) which may produce by excessive fusion, glass, in which are incorporated small crystals of phosphoric mineral; and this structure complicates the determination of the constitution of the slags. Regarding phosphorus, it should be remembered that anhydrous phosphates of iron (ferrous or ferric) that are stable at high temperatures are unknown on the contrary for calcium phosphates. Be that as it may, many writers have shown that the silico-phosphates are the principal constituents of phosphatic basic slags.

The first of these compounds has been described by Carnot (1883; formula $\text{Ca}_3(\text{PO}_4)_2$, Ca_2SiO_4); Stead and Risdale next described crystals of another compound containing phosphate and silicate (1887; formula $4\text{Ca}_3(\text{PO}_4)_2$, Ca_2SiO_4); other similar compounds were also described and in 1911, Kroll added to them another Thomasite ($\text{Ca}_3(\text{PO}_4)_2$, 3CaO , Ca_2SiO_4). Previously (1883) Hilgenstock had described the tetraphosphate (4CaO , P_2O_5), which had long been considered as the essential component of agricultural slags, but it is no longer probable that the silico-phosphates are most valuable for that purpose. Generally all the compounds are described externally, but little is known of their mineralogical individuality. It should be remembered that, as a rule, in these compounds calcium may be replaced more or less by iron or other metals, and that slags can be found with such an analysis that they will come under the formula of Thomasite. It does not follow that these slags should be considered as individualized compounds, but rather as entectic mixtures simulating pure crystals; the fact that phosphorus can pass in solid solution in silicates of iron should not be overlooked. A micrographic examination of the surface generally gives more information than the examination of sections, although the use of polarized light on the latter may be a good way to identify the minerals.

The sulphides enter into solid solution, but not to any extent; they remain partly in the form of insoluble globules. The fluorides are combined with phosphates to form minerals of the apatite class, which is the reason for the non-assimilability of fluoriferous slags.

This is about all that can be really definitely said regarding the constitution of basic slag and further research is absolutely necessary.

804.—On the Fertilizing Action of Sulphur.—

CHAUZIT, J., in the *Comptes rendus des Seances de l'Academie d'Agriculture de France*, Vol. VII, No. 21, pp. 492-493. Paris, June 1, 1921.

After many years of experiment the author thinks it possible to draw a certain number of conclusions with regard to the use of sulphur as a fertilizing agent.

(1) Sulphur distributed in cultivated soil has a very distinct action, shown by an increase of the crop, varying according to the greater or less quantity of organic matter existing in the soil, extent of surface in contact and the greater or less time of contact.

(2) The action is proportional to the quantity of sulphur used, a quantity which apparently should be fixed, economically and practically, between 400 and 600 kg. per hectare (360 and 535 lbs. per acre).

(3) The sulphur should be applied as long as possible before the period during which the plants have an intense need of nutritive elements. In other words the sulphur should be applied in the autumn or the beginning of winter and with it should be dug in farm-yard, or other organic manures, whereas, in the case of application early in the autumn (with farmyard manure) 200 kg. of sulphur per hectare (180 lbs. per acre) gives good results, the quantity should be raised to 400 kg. (360 lbs. per acre) when manuring is done in winter.

(4) The effects noticed (increase of crop, more healthy plants, greater resistance to drought, decrease or disappearance of certain diseases), are due to the fact that sulphur sets free and renders assimilable the nutritive elements in the organic matter and certain mineral matters (potash) of the soil.

604.—A Critical Study of Pot Fertilizer

Experiments.—LIPMAN, C. B., and LINHART, G. A., in the *Chemical News and Journal of Physical Science*, Vol. 122, No. 3180, pp. 137-138. London, March 24, 1921.

Waynick, Sharp and Lipman had already demonstrated that owing to the great variability of soils and of plants, fertilizing experiments of long duration cannot be of much practical value, if the factors of variation and probable error are ignored.

For this reason, Lipman and Waynick began, in January, 1919, a systematic study by statistical methods of the results of the pot fertilizer experiments carried out at the Ohio and the Pennsylvania Agricultural Experiment Stations.

Since the work would possibly be some time in the press, the authors deemed it wise to present a few of their most important conclusions. They draw attention to the fact that the originators of the experiments saw the value of replicating check pots, but did not recognize the importance of such replication for the fertilized pots, which renders it difficult to subject their data to statistical treatment. Fortunately, however, the long series of years during which the pots were studied gives a replication of each kind.

The authors arranged the data respecting the experiment pots into 8 groups according to the fertilizer; then they studied the effect of the fertilizer on each crop in the rotation, although they consider that the rotation study included in these experiments, which were themselves expensive, inadequate, and fallacious, only served to complicate a situation which was already sufficiently difficult.

The data from the pot experiments at the Ohio Station, when worked out according to the statistical method showed that:

(1) The "one-element" fertilizers produced no significant increases in yield over the yields obtained from the check plots. All statements to the contrary must be regarded as erroneous.

(2) The "two-element" fertilizers gave definite increases in yield over the check plots; but whether the increases are profit-yielding still remains to be determined.

(3) The same may be said for the "three-element" fertilizers.

(4) Different combinations of the same fertilizing element seem to have produced no difference in the results.

(5) The amount of fertilizer used seems likewise to have been without significance.

(6) Even when fertilizer experiments are properly planned, and the results adequately studied by statistical methods, our present knowledge of the enormous variability of all soils and plants renders the data from any given fertilizer plot of value only on that plot. This important consideration renders it highly probable that no fertilizer experiment as ordinarily conducted is possessed of sufficient practical value to justify the large expenditure of money, time and energy involved.

Having delivered themselves of this very severe criticism, the authors declare that they are not desirous of making a fetish of the application of statistical study to fertilizer experiments, but wish to show that if statistical methods are not applicable to the evaluation of fertilizer experiments, the latter must be accounted of even less value and significance than the authors have accorded to them.

608.—Are Vitamines Necessary for the Growth of Plants?—LUMIÈRE, A., in the *Comptes Rendus de l'Académie des Sciences* Vol. 171, No. 4, pp. 271-273. Paris, July 26, 1920.

Certain biologists have maintained that vitamines are necessary for the growth of plants (Bottomley, *Proceedings of the Royal Society of London, Biological Science*, 1914, p. 237; Mochteridge, *Ibid.*, 1917, p. 508; Agulhon and Legroux, *Comptes rendus de l'Académie des Sciences*, vol. 167, 1918, p. 597; Linossier, *Comptes rendus de la société de biologie*, April 1919, and March 1920) and this opinion, generally admitted moreover is derived from experiments of which the author by no means contests the results, but the interpretation of which does not seem to agree either with other facts or with the numerous tests made by him personally in this field.

Not only can certain micro-organisms and fungi be cultivated in chemically definite media without any trace of vitamines, but it is also possible to ensure the growth and complete development of higher plants with nutrient solutions which are purely inorganic.

Mazé (*Annales de l'Institut Pasteur*, March 1919, p. 139) has shown that maize can accomplish its complete evolution in a liquid containing 15 elements, all organic matter being excluded. It is hardly conceivable that certain plants, ranging from micro-organisms up to the most complex plants, can live and grow in mineral media, while others require vitamines for their development. The idea of the utility of vitamines in the cultivation of mushrooms is due to the fact that the authors who have upheld that thesis have used very poor, insufficient media, such as a mixture of ammonium tartrate and glycerine the addition to which of a few drops of an infusion of raisins will considerably improve the nutritive value of the broth.

If the minute quantity of material thus added includes vitamines, it also contains salts, proteins, carbohydrates, and it seems improper to conclude, *a priori*, that the effect noted is due to one rather than to others of these substances. The author has stated that a great number of definite chemical products, inorganic, and organic used in minute proportions, would give the same results as those obtained by the addition of the infusion of raisins, and sometimes they even gave better results; all these substances cannot be considered as vitamines.

Beer yeast heated to 135° C. for one hour, that is to say, which has lost all its antiscorbutic properties, can be used to prepare broths which favour considerably the growth of mushrooms grown in poor solutions having for basis ammonium tartrate and glycerine.

By methodically exhausting the yeast with alcohol, or by precipitating its extracts with phosphotungstic acid, the isolation of the vitaminic principles can be arrived at and it is thus possible to obtain, on the one hand, the exhausted yeast having no longer any curative effect on avitaminosis and, on the other hand, an extract containing the active vitamins; the latter, evaporated and then mixed with water does not improve the nutritive properties of suitable artificial media; it is sometimes rather injurious to growth, whilst the decoction of the residual yeast heated to 135° C. and deprived of its vitamins by this treatment can confer qualities which allow of a slightly more abundant growth.

By filtering organic liquids through fullers' earth to remove the vitamins, it is found that the filtrate deprived of these substances is more favourable to the growth of mildews than the liquid before its filtration.

Finally the author satisfied himself that organic extracts also, heated to about 250° C. up to the point of carbonization, preserved their fertilizing properties when they were added to a tartro-glycerin medium, and it is difficult to admit, in this case also, that the vitamins were able to withstand this temperature.

Vitamins are substances indispensable to life, which cannot be replaced by definite chemical compounds, precipitable by phosphotungstic acid and the reagents of the alkaloids; they are retained by filtration through fullers' earth and are destroyed by heat. Now, none of these properties is found in the substances which are capable of improving the nutritive qualities of poor media for plants. Therefore it does not seem proper to compare these substances with vitamins of which they do not possess any of the characteristic properties.

616.—The French National Wheat Committee.—HITIER, H., in the *Comptes Rendus de l'Académie d'Agriculture de France*, Vol. VII, No. 4, pp. 77-83. Paris, Jan. 26, 1921.

In April 1920, M. J. H. Ricard, the French Minister for Agriculture, instituted the National Wheat Committee with the general object of examining all means tending to increase the production of wheat and proposing all measures likely to insure their application.

The author reviews the results obtained in 1920 by the National Wheat Committee, through the work of its sections:—*Technique, competitions, corporate action and propaganda*. Departmental Committees, in collaboration with Directors of the Agricultural Services, Offices and Agricultural Associations, organized seed fairs, sorting sheds, wheat growing competitions, etc. Up to the present, the results satisfy the object aimed at by the creation of the National Committee

and there is every reason to predict that its scope will be still further widened during 1921.

To this end, M. Rabaté (General Secretary of the Committee) presented to the Committee, on December 18, 1920, a programme of work which was approved and, among other things, has in view the following measures:—

A general enquiry regarding the present adaptation of various varieties of wheat to the geological, agricultural and climatic conditions of various parts of France. Study of the tillage of fields under wheat and subjecting to regular controlled experiments the operations at present recommended, not always with sufficient discernment and knowledge of the very varied conditions of Agriculture in France. Cultivation of wheat in spaced lines with second ploughing, earthing-up, etc. Multiplication of wheat competitions in the different Departments. Development of the co-operative societies for agricultural tools, apparatus for threshing and sorting seeds, and more especially a new form of association, namely, co-operative seed production, grouping 10, 20, 30 of the leading farmers of each canton, having at its disposal a genealogical selection farm and a central depot for sorting and despatch. By means of control over standing wheat crops and over threshing it would be possible to deliver one or two varieties with a maximum guarantee.

M. Chasles, President of the French National Association of millers has initiated an organization of this kind in the Seine-et-Marne district.

In all parts of France progress in the cultivation of wheat can be made, but to obtain results quickly, efforts must be brought to bear on those parts which cultivate the largest areas under wheat, because they possess land suitable to the crop; and it is necessary, in the whole of those regions, to endeavour especially to improve the cultivation in those which give the smallest yields. M. Rabaté has compiled an interesting table dealing with this point. After having determined the average figures of areas in hectares and of yield in quintals for the period 1905-1914, he calculated for each Department the coefficient obtained by dividing the number of thousands of hectares sown with wheat by the yield per hectare. The higher the coefficient so obtained, the greater is the relative effort of improvement required.

631.—The Production of Tea and the Tea Trade Throughout the World, the Improvement of Old Tea Estates and Soil Treatment on Plantations.—I. JUDGE, A. S., The Production of Tea in the Empire and Its Relation to the Tea Trade of the World, *Bulletin of the Imperial Institute*, vol. XVIII, No. 4, pp. 490-523. London,

Oct.-Dec. 1920. II. MCKAY, J. M., Improvement of Old Tea Estates, in *Tropical Life*, Vol. XVII, No. 4, pp. 57-59. London, April, 1921. III. HOPE, G. D., Notice sur la preparation du sol pour la culture du the, *Bulletin Economique de l'Indo-chine*, Year 23, No. 145, pp. 814-820. Hanoi-Haiphong, Nov.-Dec. 1920.

I. As it is of great importance at the present time that the position of the tea trade in the world should be stated and explained, the author, lately Chief Collector of Customs in Burma, here gives a summary of the prevailing conditions in each country concerned with the production of tea. (pp. 717-725, *International Review of The Science and Practice of Agriculture*, June, 1921).

727.—The Cultivation of the Vine in Italy During the Last Fifty Years. SCANO, G., in the *Giornale vinicolo italiano*, Year 47, No. 22, pp. 211-212. Casale Monferrato, May 29, 1921.

In the quinquennium 1870-1874 vines were grown in Italy on 4,620,000 acres, and from 1915 to 1919 on 10,745,000 acres, an increase of 6,125,000 acres.

In most of the regions the area under vines has more than doubled, in some (the Marches and Umbria) they have quadrupled; in Emilia it has become 5 times as large. Only in 4 regions (the Abruzzi and Molise, Basilicata, Calabria, Sicily) has there been a decrease. The increase of area under vines has taken place mainly in the North and Central regions of Italy, whilst there has been a decrease, really very slight, in Southern Italy.

LIVE STOCK AND BREEDING

642.—The Value of Arsenical Dips as Remedies Against Scab in Domestic Animals in the Colonies.—VELU, H. (vétérinaire de première classe), in *La Colonisation française au Maroc*, Year II, No. 15, pp. 4-5. Casablanca, Jan. 8, 1921.

The author states that no simple and practical treatment of scab capable of application on a large scale in the Colonies, requiring neither expensive plant such as sulphur fumigating chambers or dipping tanks, nor considerable manual labour under careful supervision, by a staff without any technical knowledge, has yet been devised.

The foreign literature, however, is very rich in publications on sulphur and arsenical dips and numerous formulae have been recommended. In 1915, in South Africa, Bedford tested 18 dips prepared extemporaneously (formulae or specialties) against scab in sheep; all except one proved efficacious and cured the scab by two minutes immersion repeated at intervals of 9 days.

The author tested one of these specifics, probably an arsenical cresyl, "Cooper's Fluid," well known to breeders in South Africa, Australia and even in Madagascar. The results obtained with this product in the treatment of scab in pigs were perfect; four dippings of about two minutes, repeated at intervals of 7 days sufficed to cure the diseased animals; "Cooper's Fluid" also proved a quick and easy remedy against sarcoptic scab of horses imported into Morocco after the war.

The method was as follows:—When the 150 sick horses arrived at the hospital a small tank was made in 24 hours by building a cement wall 20 cm. in height; 200 litres of antiseptic solution were got ready of a strength of 15%. The horses were led into the tank and doused by means of a spraying pump furnished with a long tube and a Vermorel jet-nozzle; a spraying nozzle was too easily obstructed and the liquid did not penetrate sufficiently. Each day the liquid which had been used was put back, filtered through gauze. To prevent the dip getting too weak and to replace loss, 100 litres of freshly prepared solution were added each morning. In this way 25 horses were treated a day (a number which might easily have been doubled), the douche was repeated once a week and the total number of douches was 3 or 4. Although this process only permits of a restricted number of animals being treated daily, it is, however, very simple, the cost is very small and it can be employed anywhere, being sufficient for the treatment of sick horses in a military post of several hundred of horses or in breeding farms, where the stock never exceeds 1,000 head.

The author also explains that this process has the great merit of avoiding the usual disadvantages of dips for destroying parasites, such as variations in the concentration of the dip, errors in strength and above all, the decomposition of sodium arsenite. Most of the dips used in South Africa, including Cooper's Fluid contain sodium arsenite and not arsenious acid or arseniate of soda as do the French dips and it is, perhaps, to this fact that they owe their destructive power on parasites and their being less poisonous; the efficiency of these dips is further increased by the addition of an emulsion to wet the tissues.

The author further explains the composition and preparation of two other dips used in English-speaking countries and which have been employed up to date only as remedies against ectoparasites in cattle, namely Chaplin's sulphur solution recommended by the Bureau of Animal Industry, Washington, and Watkins-Pitchford's arsenical solution which ought to be tried in the treatment of scab in horses. These solutions are composed and prepared as follows:—

I.—Chaplin's Sulphur Solution.—Take 8 pounds of quick lime or 10½ lb. of slaked lime, 18 lb. of sublimed or powdered sulphur, 10 gallons of water. Stir and keep boiling for an hour. Then add water to bring the volume up to 10 gallons. Dilute when required for use in the proportion of 1 volume of concentrated solution to 9 or 10 volumes of water for sheep and 7 or 8 volumes of water for horned cattle.

II.—Watkins-Pitchford's Arsenical Solution:—

Sodium Arsenic (80% arsenic) 4 lb.
Soft soap..... 3 lb.
Vaseline Oil..... 1 gallon.
Water..... 100 gallons.

Dissolve 4 lb. of sodium arsenite in about 1 gallon of hot water; when the solution is cold, add cold water to make the volume up to 88 gallons; then add the emulsion stirring constantly and make up with water to a volume of 100 gallons.

According to the author these dips, including Cooper's Fluid, have some drawbacks. The sodium arsenite may cause more or less serious inflammation of the skin, which becomes covered with cracks, and diarrhoea, or it may become inactive by changing into arseniate. However, these occurrences will always be of slight importance and should not prevent the adoption of this method of treatment of scab in domestic animals.

650.—The Creation of an American Utility Horse.—WILLIAMS, J. O., in *U.S. Department of Agriculture, Department Circular* 153, 22 pp. Washington, March, 1921.

American light horses have long been world-famous in several highly specialized lines—for example, the trotting and saddle breeds.

The United States Department of Agriculture has recognized the need of developing a type of the native light horse suitable for general utility work on farm or ranch. With this end in view, co-operative experimental breeding work has been carried on for many years by the Department of Agriculture and horse-breeders. The ideals sought in this new type of horse are a uniform combination of size, substance, soundness, endurance and a sufficiency of speed.

Although the motor-car, motor-truck, and tractor undoubtedly will displace some horses, nevertheless, the active, sizable, utility horse, will be an increasingly important factor in American farming, especially in those sections where the heavy-draught breeds are not the most economical to use.

The co-operative breeding work was begun in 1904, with several selected mares, and the standard-bred stallion "Carmon." This remarkable sire is still used in the development of the work. The Bulletin analyzed describes the progress hitherto made at the

United States Wyoming Horse-breeding Station.

837.—Herd Books of French Breeds of Cattle.—MESLAY, in the *Bulletin de la Societe des Agriculteurs de France, Comptes rendus de l'Assemblee Generale de 1921*, meeting of March 9 (fifty second session), Part 2, pp. 44-46. Paris, 1921.

Meslay emphasizes the great services rendered by Pedigree Books and Herd Books in showing the way to improve French breeds of cattle much sought after by foreign breeders and notes that there are still too few of these Books in France. For the 30 or 35 breeds of cattle there are scarcely 15 Herd Books, of which only 8 or 10 are fully successful; the others are embryonic or in course of formation. Nevertheless the inquiry made by the Bureau of Cattle Improvement shows that a certain amount of progress is being made generally; besides some very good Herd Books some of which have already been 35 years or more in existence, others of more recent dates are not less successful.

The different Herd Books regarding which the Bureau has obtained information are the following:—(1) The Herd Book of the *Montbeliarde breed*. (2) The Herd Book of the *Limousine breed*. (3) The Herd Book of the *Charolaise breed* of the Nièvre, Saône-et-Loire and affiliated Departments, fusion of two Pedigree Books of the Nièvre and Saône-et-Loire comprising a total of about 11,000 entries of cows and heifers and about 5,000 bulls. (4) The Herd Book of the *Normandy breed of cattle*, a most successful collection comprising 18,000 to 20,000 entries of bulls, cows, and heifers. The Herd Book of the continental *Jersey breed*. (6) The Herd Book of the *Parthenaise breed* with a family or sub-breed, called *Maraichine*, very good milkers and very hardy, for which a Herd Book has not yet been compiled. (7) The Herd Book of the *Garonnaise breed*. (8) The Herd Book of the *Bazadaise breed*. (9) The Herd Book of the *Maine-Anjac breed* comprising 1,500 members and which has entries of about 8,000 animals. (10) The Herd Book of the *Black Piebald Breton breed of Finistere and Morbihan*. (11) The Herd Book of the *Armoricaine breed*, a cross between the Black Piebald and Durham breeds, with entries of 713 animals. (12) The Herd Book of the *Red Piebald Breton breed*, very clearly distinguished from the two last. (13) The Herd Book of the *Tarentaise breed*, in process of compilation. (14) The Herd Book of the *Pyrenean breed* of the Southwest with pink *mucosae*. Besides these different Herd-Books, there are a great number of breeding syndicates created before the war and other small Communal Societies with bull owners. It would be desirable that these breeding Syndicates

should first endeavour to maintain pure breeds in the districts where these exist, and then to compile for each of the breeds a Pedigree Book or a Herd Book.

839.—Experiments in Great Britain on the Effect of Feeding Concentrates Either as Warm Mash or Dry, and of the Percentage of Succulent Foods in the Ration, on the Production of Milk.—BERRY, R. A., in *The Journal of Agricultural Science*, Vol. XI, Part I, pp. 78-98. London, January, 1921.

Experiments carried out at the College Experimental Station at Kilmarnock, Scotland, with Ayrshire cows. Conditions which might influence milk production, such as the health and appetite of the cows and the weather were recorded daily. For each ration figures indicating the content in nutritive material are given.

Influence of Concentrates Fed Either Dry or as Warm Mash on the Milk Production.—During the three weeks preceding the experiments one-half of the meals were fed dry in the morning and the remainder as mashes in the evening. For the mashes the concentrates were mixed, scalded with boiling water ($\frac{1}{2}$ gallon to 9 lb. of the mixed meals) and 1 oz. of rocksalt was added.

The mixture was fed in a sloppy condition at the body temperature. As short-period experiments (5 weeks) evidenced the beneficial effect of the concentrates fed as mashes on the milk production, experiments lasting 17 weeks were proceeded with, using 10 cows divided into two groups, and taking into account their period of lactation, milk production, etc. During the first period of the experiment, lasting 5 weeks, the cows in group I were given the concentrates dry and during the subsequent periods, lasting respectively 10 and 2 weeks, the concentrates were fed alternately wet and dry. The cows in group II commenced with the concentrates fed as mashes during the first period and during the subsequent periods the concentrates were fed alternately dry and wet.

The daily ration per cow was composed of: Turnips 30 lbs., hay 7 lb., oat straw 10 lb., bean meal $3\frac{1}{2}$ lb., crushed oats $3\frac{1}{2}$ lbs., decorticated cotton cake 2 lb. The cows were watered once a day for 30 minutes at a trough in the yard and drank on an average 5.7 gallons and 4.6 gallons respectively per head for groups I and II.

The quantity of milk produced by feeding the concentrates as mashes was greater by

about 1 lb. per head per day than the quantity produced by feeding the concentrates dry. The increase diminished with the advance in lactation. The warm mashes produced a distinct laxative effect and were more readily eaten than the dry meals. It was noticed that the cows fed on rations containing the concentrates in a dry state lost the good condition of their coats. With a change back to rations containing the concentrates in a wet state or when water was readily obtainable in the byre, the animals recovered the normal condition of their coats. An increased water supply did not appear to have any effect on milk production.

In another experiment carried out in similar conditions to the former, except that the ration was modified, the periods reduced and that the cows were given water *ad lib.*, it was ascertained that for the production of 1 lb. of milk an average of 3.5 lb. of water (drinking water + water contained in the food) was consumed when the cows were fed with a normal winter ration containing 30 lb. of turnips and part of the concentrates given as wet mashes. The ratio of water consumed varied with individual cows, with the preparation of the food (concentrates wet or dry), the proportion of fodder in the ration, the period of lactation of the cows, and the temperature. For 1 lb. of dry matter in the food 3.6 lbs. of water was consumed. The total quantity of water consumed per day (drinking water + water contained in the food) amounted to about 10 gallons, of which 50 to 60% was drinking water; from 25 to 30% of the total water consumed was contained in the milk.

Influence of the Quantity of Succulent Food (Roots) contained in the Ration on the Yield and Fat Content of the Milk.—Experiments in which the quantity of water necessary for the animals was furnished respectively by feeding with succulent food (swedes) and by feeding with rations in which part of the water was taken as drinking water.

The experiments were made with 7 cows which during the first period of the experiment were given 112 lbs. of roots in their ration. During the subsequent periods 56 lbs. and 22 lbs. respectively, of roots were replaced by concentrates and fodder so as to maintain the same weight of proteins, fats and carbohydrates in the ration. The daily ration per cow was the following:—Turnips 112 lbs., hay 5 lbs., oat straw 12 lb., mixed concentrates 7 lb., (bean meal, earthen cake, crushed oats, bran and fish meal). One half of the concentrated was fed dry and the remainder in a sloppy condition.

THE AGRICULTURAL GAZETTE OF CANADA

EXPERIMENTAL DATA COLLECTED FOR THE VARIOUS PERIODS

	January	February				March				
	28	4	11	18	25	3	10	17	24	31
Average daily milk yield..... lb.	30.3	29.1	28.7	27.2	26.3	25.2	25.4	25.0	24.8	24.0
Total solids..... %	12.69	12.91	12.72	12.8	13.21	13.4	13.53	13.62	13.31	13.4
Fat weight..... lb.	1.03	1.06	1.00	0.99	1.02	1.04	1.12	1.13	1.01	1.1
Solids not fat..... lb.	2.83	2.70	2.65	2.49	2.45	2.34	2.32	2.29	2.24	2.2
Total solids..... lb.	3.86	3.76	3.65	3.58	3.47	3.38	3.44	3.42	3.34	3.2
Roots..... lb.			112				56			90

A heavy root ration (112 lb.) had a strong purgative effect which adversely affected the health and general condition of the animals. The milk yield, which had shown a tendency to increase at first, definitely decreased later. Although there was an increased percentage of fat, the weight of fat produced diminished. The fall in milk yield was partly, but not immediately, arrested by a change to a moderate root ration. As a consequence there was a decided increase in the percentage and total yield of fat. The consumption of water (drinking water) + water contained in the food) per 1 lb. of dry matter amounted to 3.9 lb. with a ration containing 112 lb. of roots and to 3.3 lb. with the moderate root ration. Some of the cows fed with the heavy root ration took on an average between 5 and 6 per cent of the total intake of water in the form of drinking water. The data relating to the influence of the temperature on the milk yield are given in 6 graphs in the text.

656.—Plant Foods Rich in Protein Replaced by a Digestible Form of Animal Epithelial Products in Rations Fed to Wool-Producing Sheep; Experiments Carried Out in Germany.—ZUNTZ, N., in the *Biedermann's Zentralblatt*, Year XLIX, Part 5, pp. 189-190. Leipzig, May 1920.

A means of increasing wool-development in sheep without the use of foods with a high protein content.

As is well known, sulphur-containing cystine, an albuminoid derivative, is the substance chiefly concerned in the growth and development of wool. Only 0.3 to 2.5% of it is to be found in the protein of nutrient liquids, and it sometimes occurs in even smaller quantities in protein food substances, whereas the cystine content of the horny constituent of wool is as much as 7.3%. Thus, in order to obtain the necessary amount of cystine, considerable quantities of protein have to be ingested. Further, it has been found, that after the decomposition of the protein and the elimination of the cystine, all the other matters that make up food protein are lost, as regards the formation of animal albuminoids, which explains the relatively large quantities of protein required in the

ration, in order to obtain a good wool-yield from sheep.

As foods rich in protein are lacking in Germany, the author, with a view to economizing plant proteins, tried to give sheep all the nutrients required for inducing the growth and development of their wool by adding to their rations, hair and other epithelial products that have been rendered digestible by chemical action. The results of the experiment were satisfactory; 4 sheep were given equal amounts of disintegrated straw and mangolds, the quantity being sufficient to maintain the weight of the animals.

Of the 4 sheep used in this experiment, 2 were given from 9 to 10 gm. of digestible horn in their rations per head per day.

After the experiment had lasted for four months, the fleeces of these animals, were much finer than those of the sheep which had been given no horn, and microscopic examination showed that the diameter of the staple exceeded by one-third that of the wool produced by the control animals.

FARM ENGINEERING

669.—A Combined Dodder and Plantain Seed Eliminator and Threshing Machine.—MANRIN, G., in the *Journal d'Agriculture Pratique*, Year 85, No. 15, pp. 293-294. Paris, Apr. 16, 1921.

Before high speed threshing machines (which date from 1889) came into use, the cleaning of fodder seeds was done by hand, or, rarely, with a small special machine, the chaff being then passed on to the chaff separator; but, between the two operations it was not noticed that certain weed seeds, such as dodder and plantain, were, so to speak, automatically eliminated owing to their shedding their seeds very easily relatively to the shedding of seed by the forage plants.

With highpower threshing machines constructed for forage seeds, effecting consecutively the various steps of cleaning, the weed seeds were not eliminated and it even happened that the machine exercised a disastrous selection by leaving among the seeds of the fodder plants the large seeds of dodder and plantain.

G. Duval, 46, Boulevard Gambetta, Saint-Quentin (Aisne) having noticed how easily parasitic plants shed their seeds as compared with forage plants, constructed a machine for eliminating dodder and plantain seeds, in the form of a sieve in the shape of a truncated cone through which he passes the chaff before cleaning it.

Duval's machine for eliminating dodder and plantain seeds was then tested by Ringelmann at the machine testing station; 12 series of tests were carried out on chaff of various origins (lucerne from the Aisne, white and violet clovers from the Aisne, crimson clover from Vendee, "minette" of the Aisne) and the produce was examined at the seed testing station. The results were considered excellent. At that time it was a separate machine through which was passed the product furnished by the first thresher; it eliminated all the seeds of parasitic plants and the residue had to be passed on to a second thresher.

Duval now presents his dodder and plantain seed eliminator mounted on a high speed threshing machine. The dodder eliminator is placed at the back below the shakers, and receives the produce passed on by the chaff beater, removes the dodder and plantain seed and then feeds the cleaner which is placed below; the latter thus only receives and has to deal with the chaff completely freed from the seeds of dodder and plantain.

According to the construction of the threshing machine, the dodder eliminator may occupy other positions, but it must always be placed immediately in front of the cleaner which it feeds with chaff freed from parasitic seeds.

With this system the seed of forage plants furnished by the thresher sells at an enhanced rate which may amount to as much as 15 and 20% owing to the difficulty that is found in separating dodder and plantain seeds that are mixed with seeds of forage plants, from which only the smallest of these parasitic seeds are eliminated, leaving the larger ones mixed with the seed used by the farmer.

670.—The "Pax" Sprayer.—L. D., in *Le progres agricole et viticole*, Year 38, No. 20, pp. 477. Montpellier, May 15, 1921.

It is well known that with ordinary sprayers, even with the best, too much of the liquid is wasted in spraying bunches of grapes, and it can be understood that, when it is a case of using an expensive solution, such as that of nicotine, there is some hesitation in giving the treatment on the grounds of expense.

The "Pax" sprayer effects a great economy of the liquid. From its powerful jet an excessively fine spray is emitted which envelops the whole grape and is deposited all around it.

The apparatus consists of a tubular brass body (cylinder of the pump) with a wooden handle in the middle; at one end of the body there is the jointed fulcrum of the lever of the pump, at the other end the suction valve with its sieve and the cock to which fits the india rubber tube connecting the "Pax" sprayer with the receptacle carried on the back of the operator. The pressure is obtained by means of a hollow-stemmed piston moved by the lever. This piston communicates directly with a nozzle fitted with a compression valve.

The apparatus is very simple; all parts are easily got at. Although the spray is emitted under a pressure of 20 atmospheres, almost 10 times that of an ordinary sprayer, the apparatus works very smoothly and the lever can be worked by a woman.

The "Pax" sprayer can be used with receptacles of any kind of sprayer without modifications of those receptacles.

752.—The "Mav" Cultivator for Rocky Land.—MARRE, E., in *Le Progres agricole et viticole*, Year 38, No. 19, pp. 455-458. Montpellier, May 8, 1921.

This new tillage instrument, designed especially for the rocky lands of the Causse, but which would be serviceable on all stony soils, even when not calcareous, has been thought out and constructed by M. Beteille, Materiel agricole et viticole (Mav), rue Pasteur, Beziers.

It has a rigid strong frame of special steel with riveted joints. The working pieces, of cast steel with interchangeable parts of hard steel, can move out of the way on meeting abnormal resistance, such as that of a rock; they are kept in place or brought back into working position by powerful springs with a very small movement, which saves them from being bent or broken. The working pieces are fixed to the frame by means of bolted rings bearing the axis round which these pieces move.

The penetration of the teeth into the soil is brought about by means of a crank axle governed through a screw by a fly-wheel, a chain, and a roller lifting the front at the same time, a seat, situated opposite the flywheel, enables a man to regulate the depth of digging while working.

The weight of the apparatus is about 1,100 lbs. It can loosen a strip of ground $5\frac{1}{2}$ feet wide; in very favourable soil an average depth of 6 inches can be reached, if necessary, by passing twice over the ground; but according as the difficulties, (hardness of the ground, the length of time it has been fallow, etc.), increase, it will obviously be necessary to pass more often over the ground to attain that depth. When that depth is reached, the soil is ready for sowing.

THE AGRICULTURAL GAZETTE OF CANADA

758.—**Reciprocating Butter-Worker.**—MAURIN, G., in the *Journal d'Agriculture pratique*, Year 85, No. 1, No. 20, pp. 397-398. Paris, May 21, 1921.

With this new butter-worker, called "alternating" it is possible to work up very small quantities of butter for which hitherto a spatula and a dish were used to get rid of the buttermilk and to work up the butter. This butter-worker, consists of a prismatic hopper with a triangular base, divided into two compartments by a partition below which rotates, in a horizontal plane, a grooved wooden cylinder worked by a crank handle outside. This handle can be placed either in the right or left of the hopper, the latter being able to rock backwards and forwards on two pivots below held in a frame which is attached to a table.

The butter is placed in the hopper which for the moment is uppermost; on rotating the grooved cylinder it draws and flattens the butter and removes the buttermilk in forcing the butter into the lower hopper, which slopes slightly so that the buttermilk and the water used for washing will drain away. Then the hopper is turned over on its lower pivots and the grooved cylinder is rotated in the opposite direction. The operation is repeated as often as is necessary, the butter being sprinkled with clean water. After

passing a few times the butter is thoroughly washed, worked up and separated from the buttermilk; it can be salted at the same time.

This butter-worker is made by the firm of L. David, 56 Route d'Evreux, Vernon (Eure), France.

RURAL ECONOMICS

759.—**Cost of Milk Production in Some States of the North American Union.**—*The Creamery and Milk Plant Monthly*, Vol. X, No. 1, p. 43. Chicago, Ill., January, 1921.

The best way of estimating the cost of milk production is to determine it carefully in each administrative unit. The Dairy Division of the Department of Agriculture of the United States has instituted an enquiry for this purpose addressed to the groups of farms in 7 States of the Union. Data referring to 4 groups are now at hand. Each group consists of 20 dairies that are typical for their administrative unit.

The aim has been as far as possible to estimate the cost of production by quantity, rather than by price, in order to be always able to interpret the data by supplying the current price. A summary of the data is given in the following table:

UNITS NECESSARY FOR THE PRODUCTION OF 100 LBS. OF MILK

	Indiana (1)		Vermont		North Carolina (2)		Washington	
Average annual milk production per cow (pounds).....	6,937		5,252		4,915		7,833	
Percentage of butter fat.....	3.8		3.9		.....		3.7	
	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer
Grain..... lb.	38.5	20.0	33.1	8.7	57.8	48.4	29.4	5.2
Hay and other dry roughage..... lb.	66.8	27.4	129.9	18.7	78.5	36.9	92.9	7.5
Ensilage and other succulent roughage..... lb.	147.6	60.1	191.3	27.8	181.5	87.0	143.3	40.4
Hauling and grinding of concentrates..... \$	0.03	\$ 0.014	\$ 0.020	\$ 0.005	.....	.....	\$ 0.022	\$ 0.003
Litter..... lb.	20.3	.....	11.2	.....	\$0.008 (a)	.....	9.0	0.1
Pasture..... acres	.....	0.040	.....	10	\$0.012 (a)	\$0.205 (a)	.....	0.025
Human labour..... hours	2.5	2.2	2.7	2.0	3.6	3.2	1.9	1.3
Horse labour (3)..... "	0.3	0.2	.6	0.4	1.8	1.8	.01	0.015
Over-head and other expenses.....	\$ 0.385	\$ 0.393	\$ 0.555	\$ 0.425	\$ 0.537	\$0.495	\$ 0.576	\$ 0.406
Calf credited units (4).....	0.012	0.013	.025	0.009	\$0.548 (a)	\$0.430 (a)	0.017	0.009
					(calf and manure)			

(a) The data for these items were obtained in money value.

(1) U.S. Department of Agriculture, Bulletin 858.

(2) North Carolina Department of Agriculture, Bulletin 266.

(3) Most dairy farmers sell their milk retail, and this labour was for transport.

(4) By unit, 1 calf is understood.

AGRICULTURAL INDUSTRIES

677.—**Cold Storage of Fruits Liable to Deterioration.**—CRUESS, W. V., OVERHOLZER, E. L., and BJARNASON, S. A., in *California Agricultural Station Bulletin* 324, pp. 25-43. Berkeley, Cal., 1920.

The authors rapidly pass in review the previous work of Fulton and Darrow on the methods of preserving small fruits by cold storage. They then recount the results of their own experiments, in which freshly-gathered cherries, apricots, loganberries, black currants and freshly prepared grape juice were subjected to different treatments before being placed in the cold chamber, and after several months of cold-storage, examined in order to ascertain their colour, texture and aroma, and subsequently used in making various products, such as jellies, syrups, tinned fruits, preserved fruits, jams and ices.

It has been found, that, whereas fruit which is not treated, and is kept at a temperature of about 0° C., loses its flavour and spoils, after some three weeks, the same fruit preserved in water, or syrup, at a temperature varying from -11° to -13° C., retains its flavour and colour for at least one month. The best results are obtained by crushing the fruit, with or without the addition of sugar, and keeping it at a temperature of -11° to -13° C. Grape-juice preserved at this temperature is much superior in aroma and flavour to pasteurized grape-juice. The breweries, which on account of prohibition, can no longer make beer, are very well equipped with plant suitable for the cold storage of soft fruits and of fruit-juice.

765.—**Contribution to the Knowledge of the Biochemical and Biological Qualities of Goats' Milk.**—CORDES, F. in the *Zeitschrift für Ziegenzucht*, Year XXII, No. 1, pp. 1-3. Hanover, 1921.

The author registered the milk production of goats during one period of lactation, and determined the percentage of fat in the milk; in addition he determined the acidity, the catalase and diastase, and he made the alcohol test.

The milk production, which was 800 kg. per period of lactation before the war, has now decreased to between 500 and 400 kg., a quantity which is still equivalent to from 10 to 13.5 times the live weight. The fat content was variable. The average figures of the percentage of fat in the milk of the different goats varied between 2.72 and 4.11%. The morning milk was, on the average, poorer in fats than the evening milk and the latter poorer than the mid-day milk.

The fat content of the morning milk is recorded as 3.29%, that of the mid-day milk as 4.19% and that of the evening milk as 3.94%.

The alcohol test for ascertaining the freshness was of no use as the milk coagulated every time.

The degree of acidity was determined by the Soxhlet-Henkel method. The values obtained showed great variations; the average figure was 4.7 degrees of acidity. The determination of the catalase gave results showing considerable differences. Thus treating 15 cc. of morning milk with 5 cc. of H₂O₂ gave the lowest value of 0.5 catalase and a highest value of 7; the average was 2.25. The figure of catalase increased with the age of the goats.

The estimation of the diastase in goats' milk was made with Konings' method; here also a marked difference was recorded between the morning and evening milk; the smaller milkings showed the higher figure of diastase; 10-30 mgm. of starch were decomposed in 30 minutes by 100 cc. of fresh raw milk. No influence of the period of lactation on the diastase content was noticed.

767.—**The Frozen Meat Industry in Brazil.**—*La Revue generale du Froid et des Industries frigorifiques*, Year II, Vol. II, No. 3, pp. 87-91. Paris, March, 1921.

The frozen meat industry in Brazil is of quite recent date, since it began in 1914; the first consignment to London, 3,000 lb., was made in December of that year by the Osasco and Barreiros packing houses in the State of Sao Paulo.

During the war the enormous demand for frozen meat required for the Allied armies gave this industry a remarkable impetus; the following statement shows the total shipments from Brazil each year up to 1920:—1914, 1,415 tons; 1915, 8,514 tons; 1916, 33,661 tons; 1917, 66,452 tons; 1918, 60,508 tons; 1919, 54,094 tons and 1920, 63,600 tons.

From an examination of these figures it would seem that the demand due to the war resulted, as principal effect, in the sudden creation of the meat industry and that this industry, which has now reached the stage of regular production, shows a tendency to develop normally, the price of Brazilian meat tending at the same time to keep level with those of other similar markets.

Statistics of 1913, based on an official census of cattle in the various States of Brazil, gave a grand total of 30,705,080 head. The States which had most cattle were:—Rio Grande do Sul, with 7,249,000 head; Minas Geraes, with 6,861,000 head; Bahia, with 2,683,000; Matto Grosso, with 2,050,000 head; and S. Paulo, with 1,322,000 head.

These figures are no longer accurate, the cattle in certain States in Brazil having considerably increased since 1913. Thus, according to recent information, Rio Grande do Sul has at present more than 8 million cattle, Minas Geraes about 7,500,000, S. Paulo, 3,803,205. These are the three

States in which cattle breeding has been specially developed and improved by the introduction of well bred bulls.

There would be no exaggeration in fixing the present number of cattle at 35 million head.

In 1913, the total number of cattle in Brazil and other cattle breeding countries in decreasing order of importance were as follows, in millions of head:—United States 63; Russia 37.3; Brazil 30.705; Argentine 29; Germany 20.15; Austria 17.8; France 14.5; England 11.8; Algeria and Tunis 11.3; and Canada 10. In the same year the average price of an average steer in Brazil was less than half the price in the United States.

It cannot be said that any breed properly speaking is found in Brazil, and all efforts of breeders are directed towards the creation of a breed by crossing and selection.

There is no doubt that in the matter of pasturage Brazil is particularly fortunate. Enormous stretches of land, selling at very low prices, are found in the north of Parana and Rio Grande do Sul, or the borders of Parana and Paraguay, as far as Matto Grosso, abundantly watered and situated at a sufficient altitude to furnish excellent pasture although the grass there is, apparently, fairly hard.

The frozen meat from Brazilian cattle has been recognized as capable, as regards quality, of comparison with the best Argentine, Uruguayan, Australian or Canadian meat on the English and French markets.

Argentine cattle yield on an average 1,000 lb. of meat per animal, whereas in Brazil the average barely reaches 500 lbs.

Consequently the 30 million head of cattle in Brazil only represent in utilizable weight, compared with the 29 million head of Argentine cattle, some 15 million head actually.

As, on the other hand, the home consumption is greater in Brazil than in La Plata, the first deduction to be drawn from these facts is that the present condition of the Brazilian herds is a long way from showing a potential annual export equal to that of the Argentine, which amounts to about 600,000 metric tons. With the generally primitive methods of keeping cattle in Brazil and the mortality which is thus caused, it is not possible to estimate a higher average annual production than 10%.

The possible export would be about 700,000 head, which at an average weight of 250 kg. would give a total of 175,000 tons of meat.

At present the capacity of industrial production is far from reaching this amount. At the present moment, there are in Brazil 12 undertakings engaged in the production and preservation of frozen meat, of which 10 are working.

The first nine establishments in working are controlled by the Federal Government

and the last by the Municipality of Rio de Janeiro. During the first half of 1919, 93,250 head of cattle were slaughtered at the Swift Current cold storage at Rosario alone. For the year 1919 the export of chilled and frozen meat was as follows, for the 3 great ports of shipment:—

Rio de Janeiro...	15,260 tons	54,094 met-
Santos.....	32,034 "	ric tons
Rio Grande do Sul	6,800 "	

As the best breeding areas are certainly Rio Grande do Sul followed by Matto Grosso and Minas Geraes, for which the port of shipment is Rio de Janeiro, it is not expecting too much to anticipate that the export from these three States will quickly reach 100,000 tons, but on condition that this quantity can be transported to the European markets by regular and sufficient lines of ships with cold storage. There, apparently, lies the kernel of the matter for, at present, the transport capacity for frozen meat certainly is not adequate to the production.

PLANT DISEASES

678.—**The Organization and Working of the Italian Phytopathological Service.**—Ministero per l'Agricoltura, Direzione dell'Agricoltura, *Rules for the application of the Phytopathological Regulations*, pp. 24. Rome, April, 1921.

A brief account of the present organization of the Italian Phytopathological Service, together with a summary of the directions for the application of the phytopathological regulations issued since 1913, especially in connection with the by-law of March 12, 1916, No. 723.

It contains a specimen of the permit-form necessary for despatching certain prohibited produce to the interior of the kingdom, and also of the immunity-certificate form for exportation outside Italy.

865.—**Flag Smut (*Urocystis Tritici*) A Tilletia injurious to wheat, recently introduced into the United States.**—TISDALE, W. H. and GRIFFITHS, M.A., in *United States Department of Agriculture, Farmers' Bulletin* 1213. 6 pp. Washington, D.C., May, 1921.

Flag smut of wheat (*Urocystis Tritici* Koern), a parasite long known in Australia, where it causes considerable loss every year, and also occurring in Japan, India, and South Africa, has recently been introduced through some unknown means into the United States.

The first report of the disease in the latter country came from the vicinity of Granite City, Madison County, Ill., in 1919, in which year a number of fields in the district were found to be infested. During the season of 1920, in the neighbourhood of Granite City, flag-smut was found in 111 fields

comprising 2,500 acres, in an area of about 47 sq. miles.

The disease is characterized by the appearance of black stripes running lengthwise in the leaf blades and sheaths, due to the chlamydospores of the fungus. The upper leaves of the plant are usually the most severely attacked, the stems are also infected to some extent. The diseased plants are generally more or less stunted, and they rarely head out, or produce seed. As a rule, all the stalks of an infected plant are attacked, but occasionally one or two remain immune.

Flag smut is spread in two ways. In threshing, the spores are knocked out of the diseased leaves and scattered over the grain to which they adhere; they germinate at the same time as the wheat when the latter is sown. This is perhaps the chief method by which the pest is propagated, the other way of spreading it, is by means of spores which find their way into the soil from infected straw, stubble and fragments of plants left on the ground when the wheat is cut, and may be carried long distances by wind and running water. Sometimes they are blown out of the separator to land near to the place where grain is being threshed. In whatever way they reach the field, the chlamydospores germinate there, and if near to seeds, may infect the young wheat seedling in the same way as those clinging to the seeds.

In order to prevent the spread of flag smut beyond the quarantined area in Madison County, and to eradicate it if possible from the infested district, the United States Department of Agriculture and the Illinois Department of Agriculture have taken steps in co-operation, and agreed upon the adoption of the following measures:

- (1) Thorough treatment of all the grain with formaldehyde as it comes from the separator.

- (2) Burning all straw in the infected area as soon as possible after threshing.

- (3) Sowing no wheat on infected land, and as far as possible sowing no wheat on land which was under wheat the previous year.

- (4) Obtaining seed from localities known to be free from flag smut.

- (5) Treatment by the copper-sulphate, or blue-stone method, of all seed to be sown. The coating formed by the blue stone and lime protects the seed from infection by chlamydospores present in the soil.

- (6) Growing varieties of wheat that are considered resistant to the disease.

Experiments conducted by the United States Department of Agriculture and the Illinois Agricultural Experiment Station have already shown, that certain varieties of wheat are, more or less, resistant to flag smut.

Fulcaster, Gipsy, Red Wave, Turkey Red, and Early May are wheats with a combination of disease resistance and good yielding ability. They are therefore strongly recom-

mended for use in the flag smut area of Madison County.

Certain other varieties (for instance Red Cross, Salzer Prize Taker, Salzer Pride, Dawson Golden Chaff, Illini Chief, and Jones Winter Fife), should not be grown under any consideration in the infested area, because of their susceptibility to the disease.

The United States Department of Agriculture, the Illinois State Department of Agriculture and the Illinois Agricultural Experiment Station are aiding farmers in every possible way to eradicate this destructive wheat pest.

867.—*Bacterium Exitiosum* N.SP. Injurious to the Tomato in the United States.—

GARDNER, M. W., and KENDRICK, J. B., in *Journal of Agricultural Research*, No. 2, pp. 123-156. Washington, D.C., April 15, 1921.

During recent years, the tomato crops in many of the north Central States (Tennessee, Illinois, Michigan, Iowa, Indiana—where the authors' researches were made—Georgia, and Florida), have been affected with a spot disease of the fruit of bacterial origin. Outside the United States, this disease has only been found for certain, up to the present, in Canada, and the Union of South Africa.

It attacks both the leaves and fruit of a large number of varieties of tomato. Sometimes, it occurs not only on adult plants, but also on seedlings. From the experiments made, it appears that the fruits of the capsicum, and the leaves of the potato are also infected with this disease.

On the tomato, the fruit lesions are small, black, scab-like spots usually superficial, sometimes crateriform. Leaf lesions are at first translucent, later black and greasy, with transparent margins, and are not usually limited by the veins.

The spots on the fruit are unsightly, and if numerous and large, render the tomatoes unsaleable, further, they afford entrance to rot-producing micro-organisms. Cannery object to this disease, because even the rather superficial lesions are not removed with the skin, so affected fruit cannot be used for first-grade canning stock.

Seedlings suffer equally severely from this malady.

The pathogenetic organism is a bacterium of which the authors give a detailed morphological and biological account in their paper under the name of *Bacterium exitiosum* n.sp.

Field observations indicate that fruit infection occurs through the punctures of insects. Inoculation tests prove that no infection of fruits takes place unless the epidermis is mechanically punctured. It is not, however, necessary that the bacterium should enter at the time the puncture is made; once present on the surface of the fruit, it takes advantage of any pre-existing

wound. Leaf infection apparently occurs through the stomata, and the lesions are more abundant on the lower surface. Young leaves are the most susceptible to the disease.

The bacterium winters on the surface of the seed and is thus disseminated. Commercial seed from fields known to be diseased has yielded about 1% of infected seedlings. The disease is also propagated by young plants when transplanted.

693.—A New Preparation of Copper Aceto-Arsenite (Paris Green) and Its Practical Advantages in the Control of the Animal Pests of Plants.—ESCHERICH, K., in the *Deutsche Landwirtschaftliche Presse*, Year XLVIII, No. 15, pp. 104-105. Berlin, February 23, 1921.

The use of Paris Green (copper aceto-arsenite) in the form of powder presents various difficulties. In order to obviate these, the insecticide has been recently placed on the market in Germany in tablets, each about the size of a tablet of chocolate,

and containing sufficient of the compound to make a hectolitre (22 gallons) of spraying-mixture. Each tablet is divided by grooves into five smaller divisions, one of which is enough to make twenty litres (4.4 gallons) of the mixture for spraying. Each of these smaller divisions is, in its turn, subdivided transversely, into equal parts, one of which is sufficient for preparing 10 litres of spray. In this manner, the weighing of the substance, an operation entailing loss of time and material, is completely dispensed with.

Further, the neutralizing agent has been incorporated into the tablets, so that the troublesome business of adding lime is wholly unnecessary.

Another and more important practical advantage possessed by the new preparation is its considerably increased power of suspension, as compared with "Uraniagrun" (the name usually given in Germany to aceto-arsenite of copper in powder form).

The experiments made by the authors have proved the new preparation to be entirely satisfactory in every respect.

OTHER ARTICLES ON SCIENCE AND PRACTICE OF AGRICULTURE

On account of lack of space the following articles in the International Review of the Science and Practice of Agriculture can only be referred to. Anyone desiring the articles may obtain them from the Institute Branch, Department of Agriculture, Ottawa.

The Agricultural Institute of Algeria.—BRUNEL, M., in *International Review of the Science and Practice of Agriculture*, Vol. XII, No. 6, pp. 659-666. Rome, June, 1921.

597.—A New Classification of the Soil Moisture.—BOUYOUCOS, G., in *Soil Science*, Vol. XL, No. 1, pp. 33-47, Bibliography of 9 works. Baltimore, January, 1921.

598.—Soil Ingredients Withdrawn by Various Fruits.—COLBY, G. E., in *The Monthly Bulletin of the Department of Agriculture, State of California, Chemistry Number*, Vol. X, No. 1, p. 23. Sacramento, California, January, 1921.

602.—Watering by Imbibition in Market Garden Cultivation.—STAPPAERT, E., in the *Revue horticole belge*, Year 2, No. 5, pp. 64-44. Huy, May 1, 1921.

610.—Line Selection of Wheat at the Phytotechnological Station "La Moncloa," Madrid.—*Estacion Central de Ensayo de Semillas, Boletín trimestral*, Year I, No. 1, pp. 2-7. Madrid, March, 1921.

611.—The Improvement of Wheat and Oats by Selection, and by Crossing Combined With Selection, in the United States.—HAYES, H. K., and GARBER, R. J., in *The University of Minnesota, Agricultural Experiment Station, Bulletin* 182, pp. 1-44. St. Paul, Minn., March, 1910.

612.—The Improvement of Barley by Pure Line Breeding and Crossing Combined With Selection, in Minnesota, United States.—HARLAN, H. V., and HAYES, H. K., in *The University of Minnesota, Agricultural Experiment Station, Bulletin* 152, pp. 1-44. St. Paul, Minnesota, March, 1919.

613.—A New Means of Obtaining Types of Maize With a High Gluten Content.—EAST, E. M., and JONES, D. F., in *Genetics*, Vol. 5, No. 6, pp. 543-610. Baltimore, November 9, 1920.

634.—Suggestions for the Right Selection of Apple and Pear Stocks.—HATTON, R. B., in the *Journal of the Royal Horticultural Society*, Vol. XLV, Pts. 2 and 3. London, July, 1920.

643.—Experiments on the Value of Intra tracheal Injection for Creating Active and Passive Immunity.—PFENNINGER, W., in the *Annales de l'Institut Pasteur*, Year 35, Vol. XXXV, No. 4, pp. 237-260. Paris, April, 1921.

THE AGRICULTURAL GAZETTE OF CANADA

- 662.—Progress of Power-Farming in France. Institution of a Central Committee of Mechanical Cultivation and Establishment of Experimental Stations.—I. *Journal officiel de la Republique Francaise*, Year I, III, No. 32, pp. 1524-1530. Paris, Feb. 2, 1921; II. *Ibid.*, No. 126, p. 5626, May 11, 1921.
- 666.—Coupling Binders to Tractors.—RING-LEMAN, M., in the *Journal d'Agriculture pratique*, Year 84, No. 27, pp. 14-16. Paris, July 1, 1920; No. 28, pp. 33-35, July 8, 1920.
- 674.—Experiments Made in the United States on the Dry-Air Sterilization of Dairy Utensils.—AYERS, S. H., and MODGE, C. S., in *Journal of Dairy Science*, Vol. IV, No. 2, pp. 79-90. Baltimore, 1921.
- 702.—The Influence of Temperature and Rainfall on the Yields of Certain Kinds of Wheat at Svalof and Ultuna, Sweden.—Recent Development of the Organization of the Service of Agricultural Meteorology in Sweden.—WALLEN, A., in *Geografiska Annaler*, Year 1920, Part IV, pp. 332-357. Stockholm, 1920.
- 711.—Characteristics of Norwegian Spring Wheats Compared with Those of Other Exotic Wheats, and Their Improvement by Means of Selection.—KNUT, VIK, in the *Norges Landbrukshoiskoles Akervekst-forsok*, Year 30, pp. 7-36. Christiania, 1920.
712. The Number and Behaviour of the Chromosomes in Certain Wheat Hybrids.—HITOSHI KIHARA, in *The Botanical Magazine*, Vol. XXXV, No. 410, pp. 19-24. Tokio, February, 1921.
- 733.—The Identification of Different Timbers.—PICCIOLI, L., in I.I.I. *Rassegna settimanale illustrata della produzione italiana*, Year V, Gen. Ser. No. 16, Sect. C., No. 4, pp. 13-15. Milan, April, 1921. (12 pages in the Institute Bulletin).
- 751.—Operating the Tractor Plough.—REED, C. O., in *Farm Implement News*, Vol. 42, No. 5, pp. 46-49. Chicago, February 3, 1921.
- 757.—Milk-Weighing Balance.—GOUDOT, G., in the *Journal d'Agriculture pratique*, Year 85, Vol. 1, No. 19, pp. 379-380. Paris, May 14, 1921.
- 766.—Freezing Broken Eggs.—I. MONVOISIN, A., in the *Revue general du Froid et des Industries Frigorifiques*, Year I, Vol. 1, No. 12, pp. 397-398. Paris, December, 1920.
- 789.—The Degree to Which Plants Can be Considered as Integral Factors Capable of
- Measuring the Complex Effect of Climatic Factors.—I. LIVINGSTONE, P. A., in *Physiological Researches*, Vol. No. 5, pp. 247-288, 1914.—II. LIVINGSTONE, B.E., *Ibid.*, Vol. I, No. 8, pp. 399-420, 1916.—III. HILDEBRAND, F. M., *Ibid.*, Vol. 2, pp. 341-405. Baltimore, May, 1921.
- 792.—Effect of Late Spring Frosts on the Geographical Distribution of Forest Trees. RUBNER, in the *Forstwissenschaftliches Centralblatt*, Year 42, Part 2, pp. 41-49, and Part 3, pp. 100-114. Bibliography of 32 publications. Berlin, 1921.
- 794.—Physico-Chemical Investigation on the Power of Absorption of Soils and on the Way in Which Plants Absorb Nutritive Matter in the Soil.—CASALE, L., in *Le Stazioni Sperimentali Agrarie Italiane*, Vol. LIV, Parts 1, 2, 3, pp. 65-113. Modena, 1921.
- 798.—Soil Protozoa.—CRUMP, L. M. (Rothamsted Experimental Station), I. Numbers of Protozoa in certain Rothamsted Soils. *The Journal of Agricultural Science*, Vol. X, Part 2, pp. 182-198, bibliography of 23 works. Cambridge, April, 1920. II. CUTLER, D. W. (Rothamsted Experimental Station), A Method for Estimating the Number of Active Protozoa in the Soil. *Ibid.*, pp. 135-143.
- 799.—Production of Mineral Phosphate in the United States in 1920.—I. *Engineering and Mining Journal*, No. 22, p. 908. New York, May 28, 1921.—II. *The American Fertilizer*, Vol. LVI, No. 10, p. 54. Philadelphia, May 7, 1921.
- 810.—Mass and Pure-Line Selection to Obtain Types of Noe Wheat Resistant to Brown Smut in Italy.—MORETTINI, A., in *Le Stazioni Sperimentali Agrarie*, Vol. LIII, Part 10-11, pp. 399-413. Modena, 1920.
- 824.—Researches on the Origin of the Oak.—HAUCH, L. A., in *Det Forstlige Forsogsvoesen in Danmark*, Vol. V, Part 3, pp. 195-120. Copenhagen, 1920.
- 835.—On the Belgian Draught-Horse.—RASQUIN, M., in the *Journal de la Societe Nationale des Agricultures de Belgique*, Year III, No. 26, pp. 201-203. Brussels, June, 1921.
- 845.—The Chinchilla Rabbit.—CASTLE, W. E., in *Science*, Vol. LIII, No. 1373, pp. 387-388. Lancaster, Pa., April, 1921.
- 849.—Causes of the Greater Resistance Met With by the Plough When Drawn Mechanically in Comparison With That Met in the Case of Animal Traction.—CASTELLI, M., in *L'Italia agricola*, Year 58, No. 4, pp. 97-100. Piacenza, April 15, 1921.

THE AGRICULTURAL GAZETTE OF CANADA

853.—**Researches Into the Returns of Swiss Agriculture During the Years 1917-1918 and 1919-1920.**—LAUR, E., Director of the Secretariat, ZAUGG, F., Chief of Division, and NATER, H., Assistant, in the *Landwirtschaftliches Jahrbuch der Schweiz*, Year 35, No. 1, pp. 91-173. Lucerne, 1921 (20 pages in the Institute Bulletin).

857.—**The Cold-Storage of Fruit.**—MONVOISIN, A., in the *Revue general du Froid et des Industries frigorifiques*, Year II, Vol. II, No. 3, pp. 80-85. Paris, March, 1921.

869.—**Telephora Terrestris T. Fimbriata and T. Caryophlea Basidiomycetes Injurious to Forest-Tree Seedlings in the United States.**—WEIR, R. A., in *Phytopathology*, Vol. XI, No. 3, pp. 141-144. Lancaster, Pa., March, 1921.

873.—**Tipula Simplex and T. Quaylii Diptera Injuring Pastures and Grain and Lucerne Fields in California.**—PACKARD, C. M., and THOMPSON, B. G., in *United States Department of Agriculture, Department Circular* No. 172, 8 pp. Washington, D.C., May, 1921.

THE INTERNATIONAL REVIEW OF AGRICULTURAL ECONOMICS

The following is a brief indication of the contents of the more important articles in the January-February number of the Institute Bulletin. Persons interested in any of the articles may obtain the original Bulletin on application to the Institute Branch, Department of Agriculture, so long as the supply for distribution is not exhausted.

Agricultural Association and Co-operation in Tunis.—25 pages. In accordance with its rapid economic development, the Regency of Tunis has not been behind in taking its part in the movement for association and co-operation which is more and more affecting agriculturists of all countries. At the present time, the most diverse forms of agricultural associations may be observed. Although the population of the Regency is made up of very distinct racial groups, these associations are, to a large extent, open to all, whether Europeans or natives. The Northern Chamber of Agriculture, and the Central and Southern Joint Chambers of Agriculture and Commerce are, however, confined to French citizens, and on the other hand three types of association are for natives only; the Consultative Chamber for Native Agricultural Interests of Northern Tunis, the native thrift societies, and the Co-operative Society of Native Horticulturists at Gabes.

A complete account of agricultural association in Tunis is given in the article under the following heads:

1. Organizations representing or studying agricultural interests.
2. Co-operative associations for production, purchase and sale.
3. Credit organizations.
4. Mutual insurance societies.

The Co-operative Abattoir of Catarane, France.—4 pages. An account of the organization and work of an abattoir installed on completely modern lines, and run on co-operative principles.

The Development of Agricultural Credit in Italy During the War.—25 pages. The provision of agricultural credit was one of the problems to which the Italian legislature devoted most attention during the war. The necessity at first of overcoming difficulties in regard to credit which arose as a result of the general monetary crisis and subsequently the need of increasing agricultural production, and in particular the production of food stuffs, in order to ensure the food supply of the country, compelled the Government to develop agricultural credit as much as possible.

The article begins with a description of the organization of agricultural credit in Italy as it existed at the outbreak of the war, then takes up the development during the war under the following heads:

1. Measures for strengthening the security for loans, in favour of the lending institutions;
2. Measures for authorizing new institutions to carry on agricultural credit operations;
3. Measures for simplifying the rules for the granting of loans, and for giving special authorizations and fiscal and legal privileges to credit institutions;

4. Measures for reorganizing the special agricultural credit institutions, so as to render their action more intensive and more effective;

5. Measures for increasing the capital of the principal agricultural credit institutions and for making special allocations of State funds.

The Maintenance of the Supply of Agricultural Labour in England and Wales During the War.—21 pages. The first instalment of a comprehensive article on the subject. This instalment deals with the question of the agricultural labourer and military service.

THE AGRICULTURAL GAZETTE OF CANADA

Other articles in the January-February number are: Agricultural Co-operation in Ireland in 1919-20; Agricultural Co-operation in Scotland in 1920; Organization and Development of "Federazione Italiana Dei Consorzi Agrari;" The Organization and First Results of the Bank of Labour and Co-operation of Italy; The Development of Co-operation in Lithuania; Agricultural Co-operation in Minnesota; The Co-operative Sale of Alfalfa Hay in Oregon; A Co-opera-

tive Society for the Sale of Ducklings in Oregon; The Norwegian Society for Mutual Insurance Against Forest Fires; Live Stock Insurance in Switzerland in 1919; Hail Insurance in Switzerland in 1919; The Folk High Schools in Denmark; Amendments to the Law on The Re-Establishment of Small Peasant Holdings in Austria; An Official Experiment in Home Colonization in France; Number, Extent and Method of Farming Agricultural Land in Sweden.

AGRICULTURAL STATISTICS

THE CROPS OF 1922 AND THE WORLD'S WHEAT PROPECTS FOR 1922-23.

By T. K. DOHERTY AND T. F. ASTLE.

The following analysis of the crop situation is based on data received up to June 20th. Tables are given showing the areas sown to wheat, rye, barley and oats in the countries from which reports have been received. These are followed by two tables giving the imports and exports (partly estimated) of wheat during the grain year 1921-22, and estimated imports for the coming grain year 1922-23. Detailed analyses of the situation in some important countries follow, and notes

are added giving the crop conditions in a number of countries.

Just before going to press a cablegram was received from the Institute, in which it was reported that crop conditions in June were good in Bulgaria and Jugo-Slavia, average in England, France, Italy and Japan, poor in Austria, Czecho-Slovakia, Germany, Hungary, Netherlands and Poland, and very poor in Algeria and Tunis.

AREAS SOWN TO CEREALS

WHEAT

Countries	1922	1921	Average 1916 to 1920
	Acres	Acres	Acres
Belgium.....	337,000	306,000	271,000
Bulgaria.....	1,928,000	2,281,000	2,128,000
Spain.....	9,922,000	10,229,000	10,270,000
Finland.....	20,000	20,000	19,000
France.....	11,860,000	12,671,000	11,078,000
Scotland.....	67,000	62,000	74,000
Italy.....	11,491,000	11,779,000	10,981,000
Jugo-Slavia.....	3,383,000	3,951,000(b)	
Luxemburg.....	29,000	27,000	26,000
Poland.....	2,434,000	1,968,000	
Roumania (a).....	5,816,000	6,149,000	
Czecho-Slovakia (a).....	1,527,000	1,538,000	1,573,000
<i>Total, Europe.....</i>	<i>48,814,000</i>	<i>50,981,000</i>	
Canada (a).....	22,464,000	23,261,000	16,968,000
United States (a).....	56,770,000	62,408,000	58,685,000
India.....	28,664,000	25,087,000	29,510,000
Algeria.....	3,034,000	2,816,000	3,134,000
Tunis.....	1,285,000	1,500,000	1,457,000
<i>Total, all Countries.....</i>	<i>161,031,000</i>	<i>166,053,000</i>	

(a) Including spring wheat.

(b) 1920; no report for 1921.

THE AGRICULTURAL GAZETTE OF CANADA

RYE

Countries	1922	1921	Average 1916 to 1920
	Acres	Acres	Acres
Belgium.....	543,000	559,000	441,000
Bulgaria.....	483,000	488,000	433,000
Spain.....	1,737,000	1,810,000	1,815,000
Finland.....	613,000	606,000	592,000
France.....	2,056,000	2,160,000	2,021,000
Italy.....	284,000	287,000	278,000
Luxemburg.....	21,000	20,000	20,000
Poland.....	10,940,000	8,837,000	
Roumania.....	481,000	656,000	655,000
Czecho-Slovakia.....	2,160,000	2,183,000	2,238,000
Canada.....	2,080,000	1,842,000	463,000
United States.....	5,148,000	4,228,000	4,927,000
<i>Totals.....</i>	<i>26,546,000</i>	<i>23,676,000</i>	

Winter rye, except for Canada and the United States.

BARLEY

Countries	1922	1921	Average 1916 to 1920
	Acres	Acres	Acres
Belgium.....	81,000	77,000	76,000
Bulgaria.....	363,000	414,000	429,000
Spain.....	3,527,000	3,562,000	4,135,000
France.....	356,000	385,000	310,000
Italy.....	544,000	541,000	503,000
Luxemburg.....	5,000	5,000	6,000
Roumania.....	259,000	162,000	104,000
Czecho-Slovakia.....	1,686,000	1,583,000	1,717,000
Canada.....	2,747,000	2,796,000	2,509,000
United States.....	7,550,000	7,240,000	8,150,000
Algeria.....	2,784,000	2,508,000	2,829,000
Tunis.....	1,063,000	1,230,000	1,175,000
<i>Totals.....</i>	<i>20,965,000</i>	<i>20,503,000</i>	

Winter barley only, except for Canada and the United States.

OATS

Countries	1922	1921	Average 1916 to 1920
	Acres	Acres	Acres
Bulgaria.....	15,000	11,000	13,000
Spain.....	804,000	821,000	
France.....	1,737,000	1,908,000	
Italy.....	1,186,000	1,199,000	1,143,000
Luxemburg.....	64,000	62,000	62,000
Czecho-Slovakia.....	2,031,000	2,003,000	1,981,000
Canada.....	16,934,000	16,949,000	13,980,000
United States.....	41,822,000	44,826,000	42,456,000
Algeria.....	596,000	558,000	587,000
Tunis.....	136,000	165,000	153,000
<i>Totals.....</i>	<i>65,325,000</i>	<i>68,502,000</i>	

Winter oats only, except for Canada and the United States.

THE AGRICULTURAL GAZETTE OF CANADA

IMPORTS OF WHEAT AND FLOUR

Countries	August 1st to July 31st, 1920-21	August 1st to July 31st, 1921-22, partly estimated	August 1st to July 31st, 1922-23, based on present indications of yield
	Bushels	Bushels	Bushels
Great Britain and Ireland.....	208,800,000	220,000,000	225,000,000
France.....	68,000,000	35,000,000	50,000,000
Belgium.....	33,600,000	48,000,000	50,000,000
Holland.....	20,800,000	18,000,000	20,000,000
Germany.....	61,600,000	60,000,000	70,000,000
Italy.....	98,400,000	90,000,000	100,000,000
Spain.....	16,000,000	8,000,000	8,000,000
Portugal.....	2,400,000	4,000,000	4,000,000
Greece.....	9,600,000	16,000,000	16,000,000
Denmark.....	400,000	5,000,000	5,000,000
Sweden.....	6,800,000	5,000,000	6,000,000
Norway.....	4,000,000	7,000,000	7,000,000
Switzerland.....	13,600,000	16,000,000	18,000,000
Austria.....	16,000,000	20,000,000	20,000,000
Finland.....	2,400,000	2,500,000	3,000,000
Poland.....	1,200,000	2,500,000	
Czecho-Slovakia.....	19,200,000	15,000,000	18,000,000
<i>Totals, Europe.....</i>	<i>582,800,000</i>	<i>572,000,000</i>	<i>620,000,000</i>
<i>Ex Europe.....</i>	<i>56,000,000</i>	<i>100,000,000</i>	<i>90,000,000</i>
<i>Russia.....</i>		<i>20,000,000</i>	<i>20,000,000</i>
<i>Grand Totals.....</i>	<i>638,800,000</i>	<i>692,000,000</i>	<i>730,000,000</i>

MONTHLY EXPORTS OF WHEAT AND FLOUR

(Flour reduced to wheat)

1921-22

Months	Canada	United States	India	Australia	Argentina	Totals, five Countries
	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels
1921-22						
August.....	6,013,000	66,963,000	220,000	5,304,000	1,983,000	80,263,000
September.....	8,770,000	38,950,000	imports 229,000	5,293,000	1,289,000	54,302,000
October.....	24,097,000	25,366,000	imports 571,000	10,056,000	954,000	60,473,000
November.....	33,106,000	19,453,000	imports 2,739,000	9,991,000	637,000	63,187,000
December.....	37,856,000	15,014,000	imports 4,427,000	7,859,000	3,040,000	63,769,000
January.....	8,946,000	14,982,000	imports 3,586,000	13,644,000	10,024,000	47,596,000
February.....	8,595,000	10,991,000	imports 3,214,000	14,570,000	20,364,000	54,520,000
March.....	10,481,000	14,370,000		12,624,000	20,620,000	58,095,000
April.....	4,045,000	10,244,000		10,544,000	17,761,000	42,594,000
May.....	16,985,000	10,000,000		13,440,000	13,504,000	53,929,000
June.....	15,000,000	10,000,000		12,500,000	12,500,000	50,000,000
July.....	15,000,000	15,000,000		12,500,000	12,500,000	55,000,000
<i>Total for Grain Year.....</i>	<i>188,894,000</i>	<i>251,333,000</i>		<i>128,325,000</i>	<i>115,176,000</i>	<i>683,728,000</i>

The figures for April, May and June for the United States, and for May and June for other countries are estimates. India is not included in the totals.

THE AGRICULTURAL GAZETTE OF CANADA

DETAILED ANALYSES OF THE SITUATION IN EXPORTING COUNTRIES

Canada.—In the following analysis of the distribution of the Canadian wheat crop the figures compiled by the Dominion Bureau of Statistics are used, except that the grain year in our case (Institute grain year) begins on the 1st of August, 1921 and ends on the 31st of July, 1922.

Production, 1921 crop, less loss of 9,026,000 bushels for cleaning		291,832,000
Carry-over Aug. 1st (which includes for the Canadian Year ending Aug. 31st, exports of 6,013,000 bushels)		13,869,000
Total amount available for distribution		305,701,000
Actual Exports, August-May	158,894,000	
Plus estimated exports for June and July	30,000,000	
		188,894,000
Balance		116,807,000
Deduct for food	45,000,000	
“ seed	43,123,000	
		88,123,000
Apparent undistributed surplus, Aug. 1st, 1922		28,684,000
Deduct quantity inspected and found unmerchantable		12,034,000
Merchantable surplus, August 1st, 1922		16,650,000

This is the merchantable surplus at the beginning September 1st, 1921, and ending close of the Institute Grain Year. The results, if shown for the Canadian grain year August 31st, 1922, would exhibit the following differences:

September 1st, carry-over (deducting August exports of 6,013,000)		7,856,000
1921 crop after deducting 9,026,000 for cleaning		291,832,000
Total		299,688,000
Actual exports, September-May	152,881,000	
Estimated exports, June-August at 15,000,000 bushels per month	45,000,000	
		197,881,000
Total balance		101,807,000
Deduct for food and seed		88,123,000
Gross surplus, September 1st, 1922		13,684,000
Deduct for grain inspected and found unmerchantable		12,034,000
Merchantable surplus, September 1st		1,650,000

United States

Carry-over, August 1st, 1921 (less exports for July, 30,413,000)		41,667,000
1921 Crop		794,893,000
Total for distribution		836,560,000
Exports, August-April	216,333,000	
Estimated exports, May, June and July	35,000,000	
		251,333,000
Balance		585,227,000
Food	489,000,000	
Seed	95,000,000	
		584,000,000
Carry-over, August 1st, 1922		1,227,000

The United States grain year really begins, however, on the first of July; hence, in order to show the distribution of the new crop without having it mixed with the old, the July 1922 exports of 30,413,000 have to be added to the carry over of 1,227,000 shown above, as follows:

Total carry-over July 1st, 1921		72,080,000
1921 Crop		794,893,000
Total for distribution		866,973,000
Food and seed (Mr. Tanner's calculation)		584,000,000
Balance		282,973,000
Actual exports July-April	246,746,000	
Estimated exports for May and June	20,000,000	
		266,746,000
Surplus, July 1st, 1922		16,227,000

THE AGRICULTURAL GAZETTE OF CANADA

If 3 per cent were deducted from the crop for cleaning, which would represent 23,846,000 bushels, there would be an actual deficit instead of the above surplus. As is the case for Canada, there is no deduction made for unmerchantable wheat of which, it appears, there was a large proportion, especially in the Northwestern States. It may be assumed that this wheat went into consumption and is included in that used for human food. No allowance is made for feed. The allow-

ance for food given by Mr. Tanner, and which seems to be pretty generally accepted was, during the normal years preceding the war, much exceeded, even with a considerably smaller population. It does, therefore, seem evident that the carry-over from the previous year, on July 1st, 1921, was underestimated, as well as the crop production itself; otherwise such large exports of merchantable wheat would not have been possible.

Australia

Carry-over August 1st, 1921.....		40,000,000
New crop, 1921-22.....		131,818,000
Total for Institute Grain Year.....		171,818,000
Exports, 1921, August-December.....	38,503,000	
Exports, 1922, January-May.....	64,822,000	
Estimated exports June and July, 1922.....	25,000,000	
	128,325,000	
Food and seed for 1922.....	40,000,000	
		168,325,000
Surplus, August, 1922.....		3,493,000

Broomhall, April 11th, states: "It will certainly make the position of buyers more secure if Russia could produce a full crop, but so long as Australia can export 96,000,000 bushels annually, instead of 40,000,000 pre-war, and Canada 200,000,000 bushels instead

of 96,000,000, the Russian loss is made good by extra production in the British Empire, and we may rejoice that such is the case for, in this matter, blood is certainly thicker than water."

Argentina

1921 Carry-over, August 1st, 1921.....		44,000,000
1922 New crop.....		154,000,000
Total for distribution, 1922.....		198,000,000
1921 Exports, August-December.....	7,903,000	
1922 Exports, Jan.-May.....	82,273,000	
1922 Exports, June and July (estimated).....	25,000,000	
		115,176,000
Balance.....		82,824,000
1922, Seed and food.....		70,000,000
Estimated surplus, August 1st, 1922.....		12,824,000

It is reported on good authority that Germany is negotiating for a loan of about 25,000,000 pounds sterling with the Argentine Government, with the object of buying grain, subject to Germany agreeing to spend half the sum on meat and other products and the other moiety on grain (all in Argentina), we understand the loan is likely to be granted.

The situation is summed up in the preceding statements from which it appears, that European supplies are sufficient to last until the new crop is available, and which is expected to be from fifteen to twenty days late. This would have the effect of abnormally lengthening the demand for the old supplies and should stimulate purchases up to the very close of the current grain year.

A rough forecast for the coming grain year is also shown in the foregoing export and import tables and analysis. The acreage in

Europe, so far as data are reported, is 2,167,000 acres less than last year for wheat and about 2,000,000 acres more for rye, the increase in rye being credited almost wholly to Poland. The smaller acreage in wheat will probably account for a deficiency of some 60 odd million bushels of wheat, which may be met in part by the importation of Polish rye if transportation facilities are available. The conditions of the wheat crop, however, as indicated in the notes which appear hereunder, are such that most of the authorities estimate a reduction varying from ten to fifteen per cent in yield. These conditions apply to all the important northern, central and western portions of Europe. The countries surrounding the Mediterranean have been more or less affected by drought; hence it is reasonable to expect, except for Poland, a reduction of 10 per cent in the wheat and rye crops of

THE AGRICULTURAL GAZETTE OF CANADA

Europe as compared with last year's. This would represent a reduction of about 100 million bushels of wheat, which would have to be made up in great part by additional imports.

Supplies will, as usual, come chiefly from the following countries, for which are made rough estimates of production, official figures being available for the United States only.

	Production		Estimated Exports
	1921	1922	1922-23
	million bushels	million bushels	million bushels
United States.....	795	855	275
Canada.....	300	350	225
Argentina.....	165	170	90
Australia.....	132	130	80
Roumania.....	75	75	30
Totals.....	1,467	1,580	700

The difference indicates an increase of 113 million bushels, which will about compensate for the additional European deficiency resulting from unfavourable weather. These exporting countries, including even Argentina and Australia, will have very little carry-over from August 1st next and start the new grain year with little or no surplus.

India may become an important factor during the coming year, as it reaped in March and April a crop which in ordinary circumstances would permit of an export of as much as 40 million bushels of wheat. This figure, however, will probably not be reached. Indeed, India, through last year's short crop, has just emerged from a serious famine and had to import up to February last for urgent needs no less than 16 million bushels of wheat. It will have to reconstitute its stocks for a margin of safety, and this becomes all the more imperative because of the fact that the monsoon rains have recently fallen earlier than usual, a circumstance which is considered decidedly unpropitious for its coming year. Hence, Mr. Broomhall believes that Indian authorities will be slow in lifting the export ban until there is a reasonable prospect for another good crop. This is a factor of the greatest importance, because, if India should be entirely out of the market, the other exporting countries cannot more than meet the world's requirements and will not in any event have their usual carry-over.

Consequently, the exporters can reasonably expect a steady demand at fair prices for their abundant crops. With the amount afloat for Europe and for British port stocks in mid-June about 30 million bushels less than last year, and the surplus in the Southern Hemisphere already pretty nearly cleaned up, the market will remain almost exclusively to North America until the new southern harvests become available in February next. It is well to remember in this connection that, if the official figures are to be relied upon, the United States does not start the new season with anything like the

72 million surplus it had on the same date last year. Even if the present fair promise of an abundant crop is finally realized, there will not be for distribution a total amount larger than on the first of July a year ago.

FOREIGN CROP CONDITIONS

In Europe generally the condition of the wheat crop was not very favourable in mid-June, except in the United Kingdom and in the Balkan States. There was a reduction in the acreage sown in most countries (as shown above).

There has been a long serious drought in North Africa, particularly in Algeria, where the damage to crops has been very serious. Recent rains have improved the situation somewhat. In the forthcoming grain year most of North Africa will have to pass from the roll of exporter to that of importer.

The harvest in Europe is expected to be from fifteen to twenty days late; the demand on the old crop supplies will, in consequence be unduly lengthened and should stimulate purchases of foreign wheat.

Alfred P. Dennis, special representative of the United States Department of Commerce at Rome, reported, June 5th, that:

"In the past three weeks the warm weather and sunshine have had a beneficial effect upon European field crops, the growth of which had been seriously retarded by the cold, wet spring. The farmers south of the Alps are now complaining of the excessive heat, but the wheat crop in Italy, Greece, and North Africa is matured beyond the point of drought injury. More seasonable conditions will not compensate for earlier losses in acreage and condition of winter cereals. An important Paris farm paper places the coming French wheat harvest 72,000,000 bushels below that of last year. Latest reports from Germany show no prospect of increased cereal yield, with fears expressed as to an inevitable food shortage next winter. It may now be accepted that

Germany, France, Great Britain and Italy, with a combined population exceeding that of the rest of Europe (excluding Russia) will each have to import more grain during the coming cereal year than was the case this season.

Russia.—Mr. Broomhall's correspondent at Bucharest, Roumania, May 25th, 1922, writes the following:—

"You ask me, when in my opinion, Russia is again likely to become an exporter of wheat. I hesitate to venture an opinion, but fear it will not be before some years. The reports I have recently had of the state of affairs in the South is so bad as to defy description. People are dying in thousands of actual starvation, as well as of typhus and cholera, and my last letters advised me that our Odessa manager and one other clerk had died of the diseases mentioned. Before anything else can be done in Russia, steps will have to be taken to stamp out disease and to restore decent sanitary conditions, and then there will be the problem of internal transport to tackle. I see in this country the result of the land passing out of the hands of the big proprietors (who cultivated same on more or less modern lines) into those of the peasantry and expect that in the case of Russia also, even when conditions begin to become normal again, production will not be on the same scale as in pre-war days for many years. An old Odessa exporter recently expressed the opinion that Russia will not have any grain to export for at least three or four years."

The opinion of this correspondent is shared by the British commissioner for famine relief in Russia in his report after his recent return from Russia. He estimates that only 35 per cent of the pre-war area devoted to winter cereals was sown last autumn. With regard to the spring wheat prospects, he says that the seed brought by the railways arrived too late, and owing to the thaw, could not be moved into the interior. Owing to the hopeless transport conditions, it is estimated that not more than 33 per cent of the required quantity of seed will ever reach the fields. This seed consists mostly of oats.

The Canadian Commissioner, Department of Trade and Commerce, at Milan, Italy reports that:

"Russia will not be in a position to export grain for at least five years. This report emphasizes the fact that under the best of pre-war conditions, especially during the period of 1909 to 1913, when the aggregate yields of wheat and rye were very good, the exports of these crops taken together did not exceed 10 per cent of their yields. In other words, approximately 90 per cent of the total quantity of wheat and rye produced in Russia was required for home consumption."

"The occupation of the large estates by the peasants and the grain requisitioning

policy that followed is said to have resulted in a considerable reduction in the area devoted to the various crops. It has been conservatively estimated that it will require at least three years to restore livestock and farm equipment to pre-war conditions. It should, however, be remembered that before Russia can be in a position to export any considerable quantities of wheat and rye, a surplus over and above the country's food and seed requirements will have first to be produced and accumulated."

United Kingdom.—The weather was favourable in May, especially during the last half of the month. Spring sowings were late. The condition of winter wheat on June 1st was very good.

France.—In April cold rainy weather had been experienced, and estimates of the acreage that growers have had to replough vary from 15 per cent to 18 per cent in the North and East, and from 12 per cent to 15 per cent in the West and Centre. The winter crop was growing best in the South, where lowest percentage of winter killed was reported.

Crops made slow growth in the first part of May and their condition was below average, but they improved somewhat during the second half of the month. In the North, where the most important wheat areas are situated, there was lack of moisture, abnormal weed growth, and insect ravages. The area sown to winter wheat is nearly 1,000,000 acres less than last year. May condition was 58 per cent compared with 74 per cent the previous year.

Belgium and Denmark.—In these countries cereal crops suffered from the cold in April. Weather conditions improved in May, and winter wheat condition was reported as average. Spring seedlings made good progress.

Germany.—On April 8th, 1922, a decree permitting unrestricted importation of wheat and rye flour until further notice was issued by the German Federal Ministry of Nutrition. As soon as the announcement was made the domestic prices dropped considerably. There has been some barter of rye flour for wheat at 130 tons of rye for 100 tons of wheat.

In the first part of May, the weather was very unfavourable and the condition of winter cereals was poor. There was considerable injury from frost. Fine weather was experienced in the last week of May and there was a small improvement in the condition of the crops.

Austria.—Early in May winter crops were reported to be backward and patchy. Later, rains benefited the crops, and on June 1st they were reported as average.

Czecho-Slovakia.—Unfavourable growing conditions were reported in the early spring.

THE AGRICULTURAL GAZETTE OF CANADA

Hungary.—Early in May, crops were reported as delayed and growth several weeks behind time. Winter cereals were medium and spring cereals between medium and good.

Italy.—The wheat crop was doing well at the end of May, but the damage done to the plant during the previous unfavourable weather had not been made good. The International Institute reported conditions as average on June 1st. The winter wheat acreage is slightly less than last year.

Spain.—There was rough, stormy weather in the first part of May, but conditions improved later. Growth was backward.

The import duty on wheat has been advanced from 46 cents to 65 cents per bushel. This duty is levied on wheat coming from countries with commercial treaties, but for countries which have no commercial treaties with Spain the duty is 42 pesetas per quintal (\$2.20 per bushel).

Jugo-Slavia.—Rains were plentiful and conditions generally satisfactory in May. The condition of crops was reported as average on June 1st.

Bulgaria.—Winter wheat was in good condition and spring seeding progressed favourably. There is a 15 per cent decrease in the wheat acreage from that of last year.

Roumania.—Broomhall's Bucharest correspondent reported, April 23rd, that:

In order to improve the export trade the new Government has set up a "Higher Economic Council," which will take the place of the "Sindex" Society, now in liquidation. The Council comprises the Ministries of Agriculture and Domains, of Industry and of the Interior; the Directors of the Railway

companies and of the co-operative societies have also been appointed. At the present moment the Council is working actively for the increase of production and an improved export trade. It is very desirable that the value of the lei should improve without further delay, as foreign creditors are pressing for payment. Certain Roumanian merchants and manufacturers have become rather alarmed at the action taken by their creditors abroad, and have sent a delegation to the Government explaining their difficulties. The Government proposes to obtain further delay by giving foreign creditors a State guarantee of payment, as the economic situation of Roumania is slowly but surely improving.

Excellent weather conditions continued during May and very favourable reports of the crops were received. There is a slight decrease in the wheat acreage.

India.—The wheat crop was harvested under favourable conditions. The first estimate of the crop is 355,000,000 bushels, compared with 253,000,000 last year, and 340,000,000 bushels, the average of the five previous years. A later revision raises the new crop to 365,000,000 bushels.

Australia.—Seeding was proceeding under favourable conditions, and an average acreage was expected.

Argentina.—Weather conditions were favourable for the preparation of the soil and the seeding of the new crop.

Mr. Broomhall believes the official estimates are somewhat low, and that on May 1st there was still a surplus of 36,000,000 bushels for export.

UNITED STATES JUNE CROP REPORT

Estimated acreage and production of crops in the United States according to the report of the Department of Agriculture issued on June 8th. The figures show that

crops made great gains during May. The final estimates for 1921 are given for comparison.

Crops	Area		Production	
	1922	1921	1922	1921
	Acres	Acres	Bushels	Bushels
Wheat.....	56,770,000	62,408,000	855,000,000	795,000,000
Oats.....	41,882,000	44,826,000	1,305,000,000	1,061,000,000
Barley.....	7,550,000	7,240,000	191,000,000	151,000,000
Rye.....	5,148,000	4,228,000	81,000,000	58,000,000
Hay.....	74,345,000	74,225,000	106,000,000 Tons	97,000,000 Tons
Apples.....			180,000,000 Bushels	97,000,000 Bushels
Peaches.....			54,000,000	33,000,000

CANADIAN JUNE CROP REPORT

Preliminary estimate of areas sown to wheat, rye, barley, oats and potatoes, with condition as on June 1, 1922.

Crop	Areas sown 1922	Compared with 1921	Condition (100 = average 1912-21)
	acres	p.c.	p.c.
Fall wheat.....	757,400	105	95
Spring wheat.....	21,706,600	96	101
All wheat.....	22,464,000	97	101
Rye.....	2,079,600	113	102
Barley.....	2,747,000	98	99
Oats.....	16,933,500	100	101
Potatoes.....	703,600	100	—

INDIA'S RICE CROP

(From U.S. "Weather, Crops, and Markets," May 27, 1922.)

All restrictions on the exportation of rice from India have been removed, the proclamation of the Government of India announcing the removal of such restrictions having gone into effect on April 1.

Restrictions on the exportation of rice were imposed more than three years ago because of the poor crops in India and high prices of rice as well as other foodstuffs. However, the prospects are good for normal wheat and rice crops in India this year, and this led to the removal of the rice export restrictions. Before the period of poor crops in India it was customary for that country to export its superior or special qualities of rice, counterbalancing such exports by importing comparatively cheap grades of rice from Burma.

The 1921-22 rice harvest in India was very good, amounting to 73,906,560,000 lbs. of cleaned rice, compared with 62,792,920,000 lbs. on 1920-21; 71,612,800,000 lbs. in 1919-20, and 55,218,240,000 lbs. in 1918-19. The average rice crop during the 5-year period of 1909-13 amounted to 75,584,500,000 lbs. The wheat crop, which during the 5-year period of 1909-13 averaged 350,736,000 bushels, amounted to 250,469,000 bushels in 1921. The average annual wheat exports during this pre-war period were 51,510,000

bushels. The 1922 wheat crop is officially estimated at 365,235,000 bushels, which is 4.1 per cent above the 5-year (1909-1913) average.

India is the largest rice-producing country in the world, the average annual pre-war (1909-13) crop amounting to 75,584,500,000 lbs. from an average acreage of 73,089,000 acres. The world production of rice during the same period, so far as statistics are available, averaged 110,780,000,000 lbs. annually. It thus appears that India produces more than 68 per cent of the world's rice. The rice crop of the United States during this period averaged 681,166,000 lbs. annually.

The consumption of rice in India during the 5-year pre-war period averaged 67,890,542,000 lbs. annually, and the average annual exports (mostly cleaned rice) amounted to 5,337,516,000 lbs. The chief importers of India rice are the United Kingdom, Germany, Ceylon, Java, Netherlands, Arabia, Turkey, the Straits Settlements, and Egypt.

Prominent rice dealers in Calcutta have stated that the removal of the export restrictions on rice will result in large shipments to Europe and America, thus in all probability enhancing the price of both Bengal and Burma rice.

THE AGRICULTURAL GAZETTE OF CANADA

LIVE STOCK STATISTICS

SWITZERLAND

Classification	Numbers on		Increase(+) or decrease(-)	
	April 21 1921	April 21 1920	in number	per cent
Horses	133 847	129 769	+ 4 078	+ 3 1
Cattle	1 424 856	1 382 116	+42 740	+ 3 1
Swine	638 761	546 122	+92 632	+17 0
Sheep	244 435	240 553	+ 3 882	+ 1 6
Goats	329 192	333 852	- 4 660	- 1 4

NETHERLANDS

Classification	Numbers on		Increase(+) or decrease(-)	
	May 1921	May 1910	in number	per cent
Horses	363 668	327 377	+ 36 291	+11 1
Cattle	2 062 771	2 026 943	+ 35 828	+ 1 8
Sheep	668 211	889 036	-220 825	-24 8
Swine	1 519 245	1 259 844	+259 401	+20 6
Goats	272 298	224 231	+ 48 067	+21 4
Poultry	9 660 799	9 777 962	-117 163	- 1 2
Beehives	93 637	69 406	+ 24 231	+34 6

AN INVESTMENT that Increases in Value the longer it is Held.

AN INVESTMENT you can Realize upon immediately, without loss.

AN INVESTMENT that will yield $5\frac{1}{2}\%$ Interest, compounded half-yearly.

AN INVESTMENT that is backed by All the Resources of Canada.

is offered you in

Dominion of Canada Savings Certificates

Denominations to suit every Investor

\$5

\$10

\$25

\$50

\$100

Obtainable at the following Prices:

\$4.25 \$8.50 \$21.25 \$42.50 \$85.00

at any Bank or Money Order Post Office

"INVEST TO-DAY!" "SAVE BEFORE YOU SPEND !!"

Issued by The Finance Department, Ottawa

DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
PUBLICATIONS BRANCH

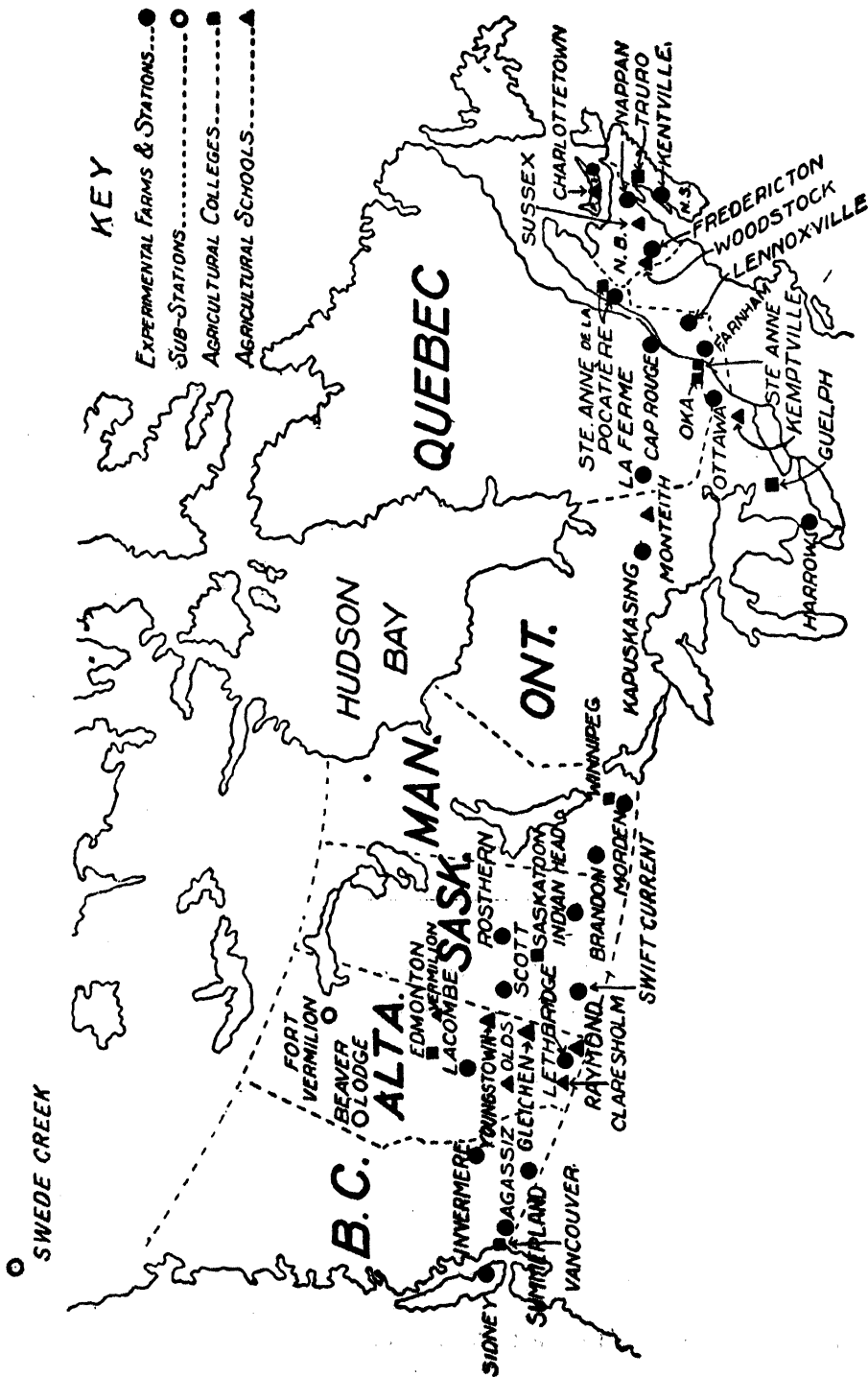
Vol. 9: No. 5

September-October, 1922

The AGRICULTURAL GAZETTE OF CANADA

J. B. SPENCER, Director of Publicity
Wm. B. VARLEY, Editor

Issued by authority of the Honourable W. R. Motherwell, Minister of Agriculture
OTTAWA



MAP OF CANADA SHOWING THE LOCATION OF FARMS, STATIONS AND SUB-STATIONS IN THE EXPERIMENTAL FARMS SYSTEM, THE AGRICULTURAL COLLEGES AND AGRICULTURAL SCHOOLS

CONTENTS

PART I.

DOMINION DEPARTMENT OF AGRICULTURE

	PAGE.
THE EXPERIMENTAL STATION, LETHBRIDGE, ALTA., by W. H. Fairfield.....	369
THE COOPERATIVE MARKETING OF PURE SEED, by Geo. H. Clark.....	373
LESSONS GAINED FROM EGG-LAYING CONTESTS, by F. C. Elford.....	376
COW-TESTING AND ITS VALUE, by A. H. White.....	378
THE FERTILIZERS ACT, 1922, by G. S. Peart, B.S.A.....	380
AGRICULTURAL LEGISLATION AND APPROPRIATIONS, 1922, DOMINION OF CANADA..	383
AGRICULTURAL INSTRUCTION GRANT, 1922-23.....	384
THE IMPERIAL FRUIT SHOW, 1922	387

PART II.

PROVINCIAL DEPARTMENTS OF AGRICULTURE

AGRICULTURAL INSTRUCTION IN SASKATCHEWAN.....	388
AGRICULTURAL INSTRUCTION IN ALBERTA.....	391
WOMEN'S CLUBS IN THE PROVINCE OF QUEBEC.....	392
THE ONTARIO VETERINARY COLLEGE, by C. D. McGilvray, V.S., M.D.V.....	393
PROVINCIAL AGRICULTURAL LEGISLATION AND APPROPRIATIONS, 1922—ONTARIO, NOVA SCOTIA, BRITISH COLUMBIA, PRINCE EDWARD ISLAND.....	398
SUMMER COURSES IN AGRICULTURE—NOVA SCOTIA.....	401
SASKATCHEWAN BETTER FARMING TRAINS, 1922.....	402
SHORT COURSES AND BOYS' CAMPS, SASKATCHEWAN, by J. G. Rayner.....	403
ALBERTA PURCHASES FINE BULL.....	405

PART III.

AGRICULTURAL EDUCATION AND RELATED ACTIVITIES

TREE PLANTING ON PRAIRIE SCHOOL GROUNDS, by Norman M. Ross.....	406
THE PRINCE EDWARD ISLAND AGRICULTURAL AND TECHNICAL SCHOOL, by Vernon Crockett.....	408
A HIGH SCHOOL POULTRY PROJECT, by Jean Thompson.....	410
PROGRESS OF ELEMENTARY AGRICULTURAL EDUCATION IN SASKATCHEWAN, by F. W. Bates, B.A., M.Sc.....	412
RURAL SCIENCE SCHOOL, TRURO, N.S.....	413
HOUSEHOLD SCIENCE DEGREE COURSE—ONTARIO.....	414

PART IV.

SPECIAL CONTRIBUTIONS, REPORTS OF AGRICULTURAL ORGANIZATIONS, PUBLICATIONS AND NOTES

VETERINARY SANITARY SCIENCE, by D. McEachran, F.R.C.V.S., D.V.S.....	415
A METHOD OF JUDGING FOWLS FOR EGG PRODUCTION.....	423
NEWS ITEMS AND NOTES.....	425
APPOINTMENTS AND STAFF CHANGES.....	431
ASSOCIATIONS AND SOCIETIES.....	432
NEW PUBLICATIONS.....	437
THE LIBRARY.....	438

PART V

THE INTERNATIONAL INSTITUTE OF AGRICULTURE

	PAGE.
FOREIGN AGRICULTURAL INTELLIGENCE—	
GENERAL INFORMATION.....	442
CROPS AND CULTIVATION.....	443
LIVE STOCK AND BREEDING.....	450
AGRICULTURAL INDUSTRIES.....	451
OTHER ARTICLES ON SCIENCE AND PRACTICE OF AGRICULTURE.....	453
THE INTERNATIONAL REVIEW OF AGRICULTURAL ECONOMICS.....	455
AGRICULTURAL STATISTICS	456

The AGRICULTURAL GAZETTE OF CANADA

VOL. IX

SEPTEMBER-OCTOBER, 1922

No. 5

DOMINION EXPERIMENTAL FARM SERIES

THE EXPERIMENTAL STATION, LETHBRIDGE, ALBERTA

BY W. H. FAIRFIELD, SUPERINTENDENT

IN the late summer of 1906 the Experimental Station at Lethbridge, Alberta, designed to serve the southern part of the province, was established. It is located three miles east of the business centre of the city of Lethbridge, and is traversed by the Crow's Nest branch of the Canadian Pacific Railway Company's line.

Owing to the extensive irrigation development that had already begun at that time in southern Alberta, the need for experimental work in connection with farming carried on under irrigation was recognized, and the farm was selected so that a part of it could be irrigated and the balance could be devoted to experimental work with non-irrigated or "dry land" farming. As a matter of fact, it could almost be said that two experimental farms were established, for the work on the dry and irrigated parts of the farm are quite distinct and have always been kept separate. Their object being not to compare the relative merits of the two systems but to study the individual problems connected with each.

The farm consisted of 400 acres of virgin prairie, and was donated, together with the water rights, to the Government by the Alberta Railway and Irrigation Company. One hundred only of the 400 acres were irrigable, but a few years later a pump was installed and the water for another 100 acres was pumped, so that at the present time one half of the farm is irrigated.

The season of 1907 was devoted to the breaking of the land, fencing and the erection of buildings. The first crop grown was in the season of 1908.

Dry Land

On the dry land the question of the best cultural methods has been given more attention and study than any other one subject. Combined with this and being part of it is the question of prevention of soil drifting and suitable rotations. Experiments with drought resisting forage crops, varietal tests of both spring and winter grains, and tests with different dates of seeding and varying amounts of seed have been carried out.

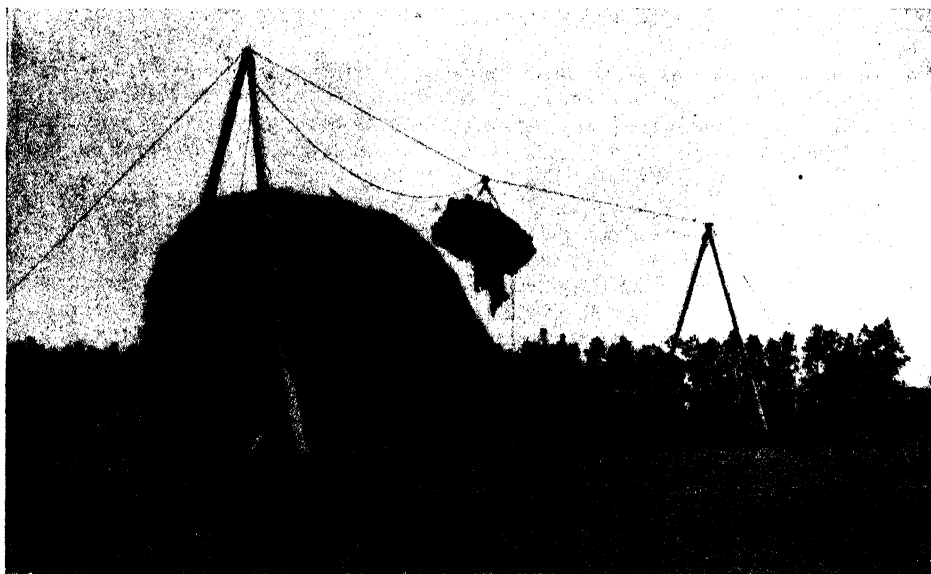
To aid in making a more extended study of the problems in connection with the best cultural methods to follow in the production of grain and other field crops under dry land conditions, a forty acre piece of land, adjoining the Station on the north, has been rented.

Irrigated Land

The necessity of investigational work in irrigation problems is quite apparent when the fact is taken into consideration that the irrigation works are either completed or in the course of construction for over one million acres of farm land in southern Alberta. The most profitable crops to raise, when to irrigate, how to irrigate, how much water to use, how often to irrigate, are some of the questions that are facing the farmers beginning irrigation, as well as those who have been living for some time on irrigated farms.

strating that it is an extremely profitable crop to raise but that it has, when ploughed up, great value in increasing the fertility of the soil for crops following it.

In animal husbandry considerable work has been done in winter feeding of steers and lambs, and with few exceptions these tests have demonstrated that farmers on irrigated land can obtain from \$15 to \$20 and over per ton for their alfalfa hay by feeding it on their farms in this way. This is of considerable importance to alfalfa growers for with the increasing area that is being



Experimental Station, Lethbridge, Alta.—Stacking alfalfa hay.

The Experimental Station is attempting to answer these questions, and it is gratifying to those in charge to realize the confidence the farmers have in and the respect they have for the work of the Station, as indicated by the increasing number of farmers visiting the station as well as the ever increasing number of letters of inquiry being received.

Crops and Live Stock

Under the head of field husbandry the experiments have indicated most clearly the value of alfalfa, not only demon-

seeded each year to alfalfa on irrigated land, the question of marketing is becoming more difficult. The Lethbridge district already produces 40,000 tons of alfalfa annually.

Pasturing Alfalfa

In connection with summer pasture experiments on irrigated land an interesting discovery has been made in regard to alfalfa. Although alfalfa will produce very much more feed per acre than any of the grasses, it has not been found safe to use for pasture for either cattle or sheep on account of the danger

from bloat. In the pasture tests carried out it has been found that where alfalfa is mixed with grass and there has been formed a good turf of some such sort as Kentucky Blue or Brome, etc., cattle and sheep may be pastured on it with impunity with no danger from bloat. Incidentally the alfalfa being mixed with the grasses doubles the carrying capacity of the pasture.

An experiment being conducted, and one that is being followed with interest by many farmers, is the pasturing of sheep on the Forest Reserve. The sheep

tions in as thorough and detailed a manner as the importance of the subject would warrant. This year, however, with the appointment of an assistant during the past winter who has had special training in irrigation, it has been possible to inaugurate some carefully planned experiments in the use of water on alfalfa, timothy, mixed pasture grasses, wheat, potatoes, and sunflowers. The particular object of the experiments is to study the effect of the application of water to the plants at varying stages of their development rather than



Experimental Station, Lethbridge, Alta.—Barn and implement house.

are shipped by rail to and from the Rocky Mountain Forest Reserve, being pastured there for the four summer months—during the time when pasture is difficult to obtain on an irrigated farm. Owing to the prices prevailing for mutton and wool for the past two seasons, since the inauguration of the experiment, the profits have not been altogether satisfactory.

Since the establishment of the Station, some experiments have been conducted in the duty of water, but owing to the lack of trained assistance it has been impossible to carry on these investiga-

at arbitrary dates. At the time of writing, although the crops are but partly grown, some very marked and interesting results are observable.

Horticulture

The possibilities in horticulture, especially under irrigation, have been determined in large measure by the experiments carried out. It has been definitely shown that small fruits such as strawberries, currants and raspberries can be successfully grown commercially. In connection with raspberries it has been found that winter killing may be

avoided by covering the rows of canes with soil instead of manure or straw. The possibility of tree growth both for shelter and for ornamental purposes has been well demonstrated by the results obtained at the Station. Rows and clumps of strong vigorous trees, 30 to 40 feet and more high, now stand where there was bald prairie when the Station was started.

Poultry

The poultry plant is rendering, it is believed, good service. Careful pedigreeing work is being done and, as a result, a high-laying strain of Barred Plymouth Rocks, the only breed of

bloom—from July 1 to the first frost in the fall—provides the bees with large quantities of honey. From a single colony as much as 407 pounds of extracted honey has been obtained in a season. The average production is usually well over 100 pounds. The principal problem in connection with bee-keeping is the question of successful wintering. Experiments in care and management, with particular reference to this problem, have been conducted, with the result that there is now considerable information available to bee-keepers and prospective bee-keepers in the district.

The Lethbridge Station has now been



Tree growth at the Lethbridge Experimental Station.

poultry kept, is being developed. The demand for cockerels and hatching eggs is many times greater than the Station can supply. The Alberta Egg-Laying Contest which is being conducted at this Station, is doing a great deal to stimulate the interest of poultrymen in increasing the egg-laying capacity of their flocks.

Bee-Keeping

The work with bees has proved to be of considerable value. Alfalfa is the main, in fact the only, honey plant of any real value, but it's long season of

in active operation for fifteen years. From the beginning the work of the Station has been followed closely by a large body of the farmers in the southern part of the Province. The general settlement of southern Alberta, that is, the taking up of the land for grain growing rather than for ranching, was in progress at the time the Station was established. Incoming farmers visited the Station in large numbers, and these men have since then been turning to the Station for suggestions and help from time to time as new problems developed in their farming operations.

THE CO-OPERATIVE MARKETING OF PURE SEED

Plans for the Efficient Merchandising of Seed Produced by Members of the Canadian Seed Growers' Association

BY GEO. H. CLARK, COMMISSIONER, SEED BRANCH

THE Canadian Seed Growers' Association constitutes an organization of experienced seed growers, many if not most of whom devote their principal efforts toward the multiplying and maintaining in their purity and productiveness the "Elite" stock seeds that are produced by expert plant breeders who are for the most part employed in connection with government experiment stations, both federal and provincial. Seed growers who are operating under the direction of the Association have come to be regarded as the important connecting link between the plant breeder and farmers in general. Without the service of our growers of registered seed, it is reasonable to conclude that much of the excellent results derived from the work of plant breeders would become dissipated and, in consequence, farmers in general would not receive the full benefit from their work.

Heretofore, local demand for registered seed absorbed a large proportion of the total quantity produced within the district where it was grown. The secretary, by means of an annual catalogue and replies to inquiries, has been able to supply a marketing intelligence service which in most years enables seed growers to distribute their registered and other good seed. The recent enlargement of the plan for registration has made it practicable to develop seed production centres with quite extensive acreage of seed crop under superior conditions of soil and cultural practices that are particularly favourable to the kind of crop. Thus the total production of Registered seed and of Extra No. 1 seed grown from registered seed, has been and is being increased in geometric ratio as compared with ten years ago. It is important that effective measures be

adopted to ensure the efficient distribution and the general use of all the best quality of seed produced by our growers, and in addition that any surplus remaining in favourable years of production be made available for export. Our best qualities of northern grown seeds have come to be highly regarded in many of the States to the south.

Unfortunately, because of the want of proper organization, the distribution of Registered seed, and of Extra No. 1 grade of seed which is grown from registered seed, has not been fully satisfactory. It was this fact that led to the passing of a resolution at the recent annual meeting of the Canadian Seed Growers' Association, recommending the formation of organizations for assembling, cleaning, storing, financing, and marketing of superior quality seeds of all kinds of our staple crops; and that, pending the organization of a Canadian Seed Growers' Co-operative Association, the Seed Purchasing Commission be given authority to provide a service for selling the surplus of such seed.

The constitution and charter of the Canadian Seed Growers' Association do not provide the authority necessary to enable it to enter into the field of merchandising on behalf of its members. Being supported in part by the government, it would be quite improper for that Association to enter into competition with private companies engaged in the seed business. The government now has one fairly well established and experienced organization for the merchandising of seed grain, the Seed Purchasing Commission, and inasmuch as trading is not generally regarded as a proper function of a government, it is to be expected that as soon as co-operative endeavours in the assembling and

distribution of good seed have become sufficiently well developed to meet the very real needs of agriculture, particularly in the prairie provinces, the operations of the Seed Purchasing Commission may thereafter be discontinued as a governmental institution.

The provincial government of the province of Quebec several years ago established and now have an excellent assembling, cleaning and distributing plant at St. Rosalie Junction, Quebec. The provincial government of British Columbia have more recently developed and are in process of guiding the development of an assembling, cleaning and distributing plant at Penticton, B.C. The farmers' co-operative organization of the province of Prince Edward Island have an efficient seed warehouse and cleaning plant at Kensington, P.E.I. The grain growers of Saskatchewan have had under consideration for several years the setting apart and equipment of two or more of their elevators for the assembling, cleaning and distribution of Registered and Extra No. 1 seed grain. The latest very satisfactory information is that the Minister of Agriculture for the province of Alberta has indicated that for that province he will provide on the basis of service at cost, well equipped warehouse facilities for the assembling, cleaning and distribution of Registered and Extra No. 1 seed grain and other seeds that may be grown in the province of Alberta. In the early future there will be need for similar efficient plants for the assembling, cleaning and distribution of Registered and Extra No. 1 seed at Winnipeg, Port Arthur and Toronto. Their advantage to the seed growers and their pronounced benefits to farmers in general have been and will continue to be so obvious, that we may be reasonably sure of their early development at all centres where they are really needed and without the Canadian seed growers doing more than demonstrating their usefulness and the sound economy of their development and operation on the basis of service at cost.

These special seed cleaning and distribution warehouses ought not to become a public charge, and assuredly will not become a public charge unless, as frequently happens, their development gains a momentum in excess of requirements, with the result of having warehouses where they ought not to be established.

During the recent session of Parliament much was heard about the pooling system for the selling of wheat. That system was in vogue for several years, and with much success in the province of Saskatchewan in the co-operative marketing of their dairy produce. Members of the Canadian Seed Growers' Association would be well advised carefully to consider the advantages that might accrue to them not only from their connection with a provincial or district seed growers' co-operative, but also from the adoption of the pooling system of selling their seed grain through the medium of their co-operative. It will be the privilege of any provincial or district seed growers' co-operative to license their warehouse under the Canada Grain Act, and to secure from any chartered bank financial advance on all of the seed grain that may have to be carried from autumn until the following spring. The merchandising efforts of provincial or district seed growers' co-operatives may with splendid advantage be reinforced by an interprovincial seed growers' co-operative which would provide the much needed service of distribution as a selling agency, particularly for interprovincial and export trade.

In the meantime the Seed Purchasing Commission will continue to function—at least Parliament secured that assurance from the Government while the estimates for the Seed Branch were under consideration. The Seed Purchasing Commission have since 1916 merchandised upwards of sixteen and a half million dollars worth of seed grain, and their operations have in no sense resulted in a net charge on the Treasury.

They have available to them the large Canadian Government interior terminal elevators which are operated on the basis of service at cost by the Department of Trade and Commerce. These elevators were not specially constructed for handling seed grain, although they are well equipped with cleaning machinery. Grain of commerce is moving into and out of them daily and it is only through the exercise of unusual care that the Seed Purchasing Commission have been able to handle through them the inferior grades of commercial seed grain which are composed of mixed or comparatively impure varieties.

It has been unfortunate that the Seed Purchasing Commission have not been in a position to assemble, clean and distribute Registered and Extra No. 1 grades of seed grain. As soon as provincial or district seed growers' co-operatives in the prairie provinces are able to deliver to the Seed Purchasing Commission proper warehouse receipts for seed grain of approved varieties, re-cleaned and in sacks, together with the official inspection certificate issued under provisions of the Seed Control Act, the Commission will be in a position to co-operate by providing efficient marketing service, including reasonable financial advance under the co-operative pooling system. The primary object of the Seed Purchasing Commission will be to secure for distribution as much as possible of Registered and Extra No. 1 grades of seed of the comparatively few kinds of varieties that are approved for distribution by them. It is considered unreasonable to expect that the Seed Purchasing Commission, or a Canadian seed growers' co-operative that may later come into existence, should undertake the organization and development of provincial or district seed growers' co-operatives, each of which will naturally be a separate financial unit. Whether the provincial or district seed growers' co-operatives that are already in existence, or that may be developed, will be in a position to co-operate with, or

utilize the services of, the Seed Purchasing Commission or any other inter-provincial selling agency that may be brought into existence, will of course depend on the constitution and the business practices of the provincial or district co-operative. Consideration of such matters may quite safely be left to those who are well experienced in co-operative endeavour as applied to business. Those interested in promoting provincial or district co-operatives may be depended upon to find the proper foundations for co-operative merchandising, not only in consideration of the relations that should exist between them and the seed growers whom they are to serve, but also between them and any central selling agency to whom they may look for service.

The service of official inspectors under the Seed Control Act will continue to be available for the official grading of all kinds of seed for commerce. Shipments of registered seed arriving at the central seed cleaning plant will have to be accompanied by a statutory declaration on the printed forms of the Canadian Seed Growers' Association signed by the seed grower, identifying the seed shipped by him with the seed crop for which he holds registration certificate from the Association. The official inspector may thereafter be depended upon to protect the best interests of the Association and its members, by adhering to the standard of quality that may be defined by the Association and enacted into law under the provisions of the Seed Control Act.

In this connection, it may be stated that an endeavour is being made to co-ordinate the established systems of grading seed grain and other seeds as between that employed by this Association and that as defined in the Seed Control Act. It is believed to be more simple from the viewpoint of the interested public and in the best interests of all concerned, that we should have in Canada one system for the nomenclature of quality in seeds, and that the terms that may be employed to designate qual-

ity shall be: (1) Elite stock seed, (2) Registered seed, (3) Extra No. 1, (4) No. 1, (5) No. 2, (6) No. 3, (7) Rejected. Inasmuch as Elite stock seeds may scarcely be said to be available in quantity for commerce, it is not considered necessary to safeguard the employment of that term under legislative control of the seed trade. It is, however, thought advisable to establish a legal standard for registered seeds and to protect the use of that term as applied to seeds of commerce in common with the inferior grades of seeds that have been established under the Seed Control Act. This is considered advisable, if not really necessary, in view of the contemplated activities looking to the development of a more satisfactory distributing service for superior quality seeds of all kinds of our staple crops.

Canadian farmers have become accustomed to securing service from the Department of Agriculture free of charge. They do not complain because the Department of Trade and Commerce levies a charge sufficient to cover the cost of

the service of grading their grain for milling or feeding. It is quite probable that the service of inspection for Registered and Extra No. 1 seed grain that is assembled at central warehouses may be provided for a nominal charge sufficient for a few years to pay only a part of the cost of providing the service.

With the gradual further development of co-operative endeavour in the marketing of the seed grain produced by its members, the Canadian Seed Growers' Association will take a wholesome interest and extend whatever measure of support may be proper and helpful. We may be sure that its particular field of work will materially enlarge in proportion as the results of the work of our experienced seed growers are made more conveniently available to the farmers of Canada who have now been tutored for twenty years by the Association, and for much longer by other organizations, as to the advantages that accrue from the use of the best quality of seeds that can be produced.

LESSONS GAINED FROM EGG-LAYING CONTESTS

BY F. C. ELFORD, DOMINION POULTRY HUSBANDMAN

IT is now nearly five years since the Experimental Farm started its first Egg-laying Contest in Prince Edward Island. Four years ago the Experimental Farm started seven egg-laying contests throughout the Dominion. Three years ago we started a contest in each Province, open to the Province, and one, called the Canadian, open to the world. At the present time we are operating ten contests, one for each Province, situated at one of the Experimental Farms or Stations in that Province, and the Canadian which is situated at Ottawa.

Egg-laying contests have for years been known merely as spectacular features. Canada was the first country to standardize them and to make them a

medium for something other than purely advertising propositions.

The Record of Performance in Poultry was established by the Dominion Department of Agriculture four years ago. It is divided into two sections, "A" and "A.A." The latter comprises birds qualifying in the egg-laying contests.

The contests start on November 1 each year and continue for 52 weeks. At the end of that time the birds are sent home and a new contest begins. The number of birds, by provinces, in the 1921-22 contest was as follows:—Canadian, 600; Prince Edward Island, 200; Nova Scotia, 200; New Brunswick, 200; Quebec, 200; Ontario, 280; Manitoba, 200; Saskatchewan, 180; Alberta, 290;

British Columbia, 290. These birds are sent in by private owners; they are housed at one of the Experimental Farms, fed by the Farm, and the eggs retained. Reports are issued once a week, and other reports periodically throughout the year.

We have gained considerable experience during the last few years in conducting these contests, and each year we are becoming more efficient. This year we have had less trouble through the dissatisfaction of people who entered their birds than ever before.

The contests have proven that Canada is a good country for egg production. The reports of production given by the various pens in the contests compare very favourably with pens in other contests. Take the eight leading contests in America for the winter period November to April 17. The British Columbia contest at Agassiz comes out first with an average production of 78.4; Ontario second with 68.4 production and for third we get, Storrs, Connecticut, with 1,000 birds and a 66.4 production. Then comes the Canadian, with 600 birds and 65.5 production, followed by New Jersey; Vineland, with 2,000 birds and 63.8 production. The Vineland birds are yearling hens, so the comparison is hardly just. Following Vineland, comes Manitoba where it was once thought the winters were too cold to secure high production. The contest was held in Brandon, Manitoba, where the thermometer went down to 44 degrees below zero, and they had 63.1 production. The seventh place is held by Lethbridge, Alberta, with 62.2, and the eighth place by the North American Contest held at Milford, Delaware, where there were 500 birds with 60.5 production. Therefore, one of the lessons which the contests have helped us to learn is that we can produce winter eggs in quantities in Canada in spite of the cold climate, and that our climate is not a detriment to production.

Another lesson: High production is not always obtained from the heavy or

general purpose varieties, for the light varieties have done exceptionally well in the winter months. The opinion was at one time quite general that the Mediterranean breeds were unsuited to the colder sections of Canada. Ottawa is one of the places where high production has been obtained from the Mediterranean breed. The Canadian contest gave an average for the heavy varieties of 83.5 and for the light varieties of 83, just half an egg more for the heavy varieties during the winter months than for the light varieties. Prince Edward Island, 50.5 for heavy; 56.4 for the light—the light breeds there beat the heavy breeds. Nova Scotia, 71 for the heavy; 53.9 for the light; New Brunswick, 64 for heavy and 61 for light. The Ontario contest which is situated at Ottawa along with the Canadian gave an average for the heavy breeds of 90.3 and 85.4 for the light; Manitoba, 72.3 for the heavy, 85.4 for the light; Saskatchewan, 76.3 for heavy, 47.6 for the light; Alberta, 74.6 for the heavy and 68.8 for the light; British Columbia, 95.3 for the heavy and 96.7 for the light. The average for the Dominion is 84 for the heavy and 80 for the light, and that covers November, December, January, February, March, April and half of May of the past winter.

Another lesson we have learned is that there are not nearly so many 200 egg hens in Canada as advertising matter would indicate. In view of the results obtained by the contests in the whole Dominion, it is quite evident that some people advertise higher production than they are able to substantiate. The average hen on the average man's place is not any better than the average hen which gets in the laying contest, nor do I think that the man who has advertised a high laying strain is more likely to get this high production than we are in the contest. The percentages in the several contests were as follows: The Canadian had 6.8 per cent of the birds entered that laid over 200 eggs; Prince Edward Island did not have one that

THE AGRICULTURAL GAZETTE OF CANADA

went 200 eggs; Nova Scotia had 2.4 per cent; Quebec had 1 per cent; Manitoba 9.5 per cent; Saskatchewan 1 per cent; Alberta 3.6 per cent, or an average in the whole Dominion of 4 per cent of the birds in all the contests at that time which laid over 200 eggs. British Columbia was not in the contest at that time. Take the contest for 1920 to 1921, the Canadian gave 11.3 per cent of the birds that went over 200 eggs. Prince Edward Island did not have any the first year but had 1.6 per cent last year; Nova Scotia 3.6; New Brunswick 10.3 per cent; Quebec had half of one per cent; Ontario 8.7 per cent; Manitoba 7.3 per cent; Saskatchewan 2 per cent; Alberta 5.2 per cent; British Columbia 37.3 per cent, or a total for last year in all the contests of 9.6 per cent over the 200 mark against 4 per cent the previous year. The contests, therefore, have indicated that there are not as many 200 egg hens in Canada as there were a few years ago.

Another lesson we have learned is that the contests are good mediums for advertising. This fact has led to a certain amount of misrepresentation in a few instances. We have endeavoured to overcome this difficulty by collecting as much information about the pens as we could from the owners with a view to finding out whether the birds were their own, whether they are bred the same as their own flock which they have at

home, and if they do well, have they more at home of the same kind.

This is the fourth year for some of our contests, and we have learned that there are some consistent breeders in Canada, who year after year, have had pens in the contests and whose pens have done consistent work, though they may not be taking first place. The breeder who puts his pen in the contest year after year, giving a fair to good showing each year, is the class of breeder who is going to make a mark for himself. There are some breeders who rush a pen in and do some very spectacular work for the time being, but who may not have the best stock to breed from. Rather it is the man who puts in birds that will give a good account of themselves year after year who is valuable to the country.

These contests have indicated that the second lot of pullets from a high producing pen not bred by the person entering are usually not as good as the original stock. The owners did not use the best of judgment in the mating of the mothers. That is unfortunate. But because of that the egg yield of the birds in the contest has gone down, the same as the egg yield has gone down with the birds that were kept at home. A contest in anything which will stimulate importation of good material is a good thing, but what use is good stock if we do not keep it good.

COW-TESTING AND ITS VALUE

How One Herd Has Been Improved by This Means

BY A. H. WHITE, SENIOR DAIRY PROMOTER

SOME eleven years ago, J. G. Wait, Colborne, Ont., started to keep records of production of each cow in his herd. To-day, Mr. Wait's herd is an outstanding example of the results to be obtained through cow-testing where dairy records are used by the dairyman as a guide to his operations in breeding and feeding and selection.

At the end of the first year of testing in 1911, the average production of fourteen cows in this herd was only 5,438 lb. milk. At that time a test was not made for butter fat. In 1921, the average production of fifteen cows was 10,080 lb. milk and 371.3 lb. fat according to the records received at the office of the Dairy Branch. This is an increase of

nearly 100 per cent, and income has been raised from about \$500 in 1911 to over \$3,000 in 1921, an increase of over 600 per cent. Dairy records have certainly proved a great benefit to this man in his business.

After the first year of this work, Mr. Wait found some wide differences in the production of his individual cows. The highest production was 7,676 lb. milk while the lowest was 2,976 lb. milk. There were also several other cows which were not paying for the feed consumed. These cows were sold and others purchased to take their places and in 1913, the production per cow was increased to 6,967 lb. milk from eleven cows. In 1914, only eight cows were in the herd for the full year and the average production for these cows was 9,328 lb. milk. Thus after four years of careful selection of the best cows and a weeding out of the poor producers, Mr. Wait had eight cows which produced almost the same amount of milk as fourteen cows had produced during the year 1911. These results made for more economical production as the feed and labour costs were not so great while the income was nearly the same.

The increase in production during the first few years was due almost entirely to weeding out the poorer cows although pure-bred sires had been used in herd. From this time on, heifers from pure-bred sires were freshening and replacing the old cows or those found to be real boarders.

When records were first kept, this herd was a grade herd similar to those found on the majority of farms. They were a nondescript bunch of cattle with all sorts of grades and crosses. However, the pure-bred cow appealed to Mr. Wait and he started in early to purchase pure-bred Holstein cows. One of these cows has a total production of over 100,000 lb. milk in eight years or an average of 12,500 lb. milk per year, which is a very creditable record. Another foundation cow has a production of 54,656 lb. milk and 2,073.8 lb. fat in four years,

an average of 13,664 lb. milk and 518.4 lb. fat per year.

After 1914, it was more difficult to obtain increases in production as it was impossible to buy the higher producing cows except for exceptionally high prices and Mr. Wait was content to build up his herd by using as good a sire as he was financially able to purchase. However, there was progress each year, and the highest average production per cow was reached in 1918 when eight mature cows averaged 12,547 lb. milk and 439 lb. fat. This was the first year records of butter fat records were kept and the tests were very good. The last few years, young heifers have been added to the herd and have decreased the average production for the whole herd, but the highest individual production was made in 1921 when one cow produced 16,319 lb. milk and 603.9 lb. fat during the calendar year.

In May of this year, Mr. Wait branched out and did some official testing. He put four of his cows on the seven-day Record of Merit test and had the satisfaction of having one of them head the list of mature cows with a production of 741.7 lb. milk and 26.31 lb. butter fat or 32.89 lb. butter in seven days. The other cows did well and all had records of over 22 lb. butter in seven days. His best cow was also on R.O.P. test and for the 365 day period had a record of 17,031 lb. milk and 760 lb. butter. These records are very creditable considering that they were made during Mr. Wait's first attempt at official testing and were made by cows which have been bred and raised by himself.

Mr. Wait is a good feeder and gives his cows every care, which tends towards increased production. He has two silos on the farm thereby insuring plenty of succulent feed and he feeds a grain ration of bran, shorts, oat chop, corn, oil meal, and cotton seed cake. These grains and concentrates with clover hay and silage make a well balanced and palatable ration, which has helped in

keeping up milk production. Mr. Wait also believes in feeding according to production, and has found the daily milk record a great help in apportioning his grain ration properly.

The value of using only good, pure-bred sires has been well demonstrated in the progress of this herd. At the present time, it is composed entirely of pure-bred Holsteins, and has been built up from two or three foundation cows. The daughters have proved to be better producers than their dams. Before selling off all his grades, Mr. Wait had some very high producing grade cows in the herd. Two grade Holsteins had average production records of over 12,000 and 11,000 lb. milk extending over a period of years. Such records as these demonstrate the value of the pure-bred sire even in a grade herd.

Nor has Mr. Wait been alone in the matter of herd improvement. There are three or four other farmers in the same district who can point to increased production due to selection, feeding, and the use of pure-bred sires, and these men have been guided in their work by the milk record sheet and Babcock tester. They have been testing for some

years and have obtained results. In 1919, the average production of 61 cows in 6 herds was 8,623 lb. milk and 302.4 lb. fat; while in 1921, the average production of 53 cows in four herds was 9,413 lb. milk and 335.6 lb. fat, showing a decided increase in the last two or three years, and an average production fully 100 per cent greater than that of all dairy cows in Ontario or in Canada.

Such are the results that can be secured through a wise use of the knowledge obtained by keeping a record of milk and fat production. These men are not situated any more favourably than many others, and have to build as they go along. They have, however, built on sane lines and have worked to reach a standard that they had set for themselves. Nor have they worked blindly and by guess work as many farmers are doing. They knew each individual cow, fed her according to production and used only such sires as they knew came from stock that could improve their herds. When such improvement can be obtained in one herd, surely cow testing is worth while to all dairymen who are anxious to improve their herds.

THE FERTILIZERS ACT 1922

BY G. S. PEART, B.S.A., CHIEF OF MARKETS AND FERTILIZER DIVISION, SEED BRANCH

THE provisions of the New Fertilizers Act differ from those of *The Fertilizer Act, 1909*, and amendments of 1919, in detail more than essentials, though certain new provisions have been added as will be shown.

Under the Act of 1909 and the amendments of 1919, "fertilizer" was defined as any manufactured manure that contained nitrogen, phosphoric acid or potash. The new Act prohibits the sale of any material as "fertilizer" unless such material contains a total of 12 per cent or more of the plant food substances, nitrogen, phosphoric acid and potash,

singly or combined; furthermore the nitrogen, phosphoric acid or potash content must not be claimed as present in a fertilizer or be a part of the total of 12 per cent unless they are present in minimum quantities as follows: atomic nitrogen 2 per cent, phosphoric acid (available P_2O_5) 5 per cent, potash (K_2O soluble in water) 2 per cent.

The inclusion of this provision makes it unlawful for any person to sell in Canada under the name of fertilizer, lime in its various forms or other soil conditioners or materials that contain unimportant amounts of nitrogen, phos-

phoric acid or potash. Basic slag, or natural rock phosphate, or a mixture of both, are not subject to this provision, but must be sold true to their respective names, unadulterated, and the fineness to which they are ground must be guaranteed, as well as the percentage of phosphoric acid present.

The old Act provided a system of registration for each brand, and an annual license to sell. Under the new Act, these two phases have been combined in the form of an annual registration for each brand, with the following exemptions:—

(a) Fertilizer that is manufactured subject to a prescription signed by the purchaser;

(b) The following fertilizer, when sold in a commercially pure state, true to name, and containing not less of the plant food substances as specified:

Nitrate of soda, 15 per cent nitrogen;

Sulphate of ammonia, 20 per cent nitrogen;

Superphosphate (acid phosphate), 16 per cent available phosphoric acid;

Basic slag (Thomas phosphate), 10 per cent total phosphoric acid and 80 per cent fineness;

Natural rock phosphate of stated origin, 25 per cent total phosphoric acid and 80 per cent fineness;

Sulphate of potash, 48 per cent potash soluble in water;

Muriate of potash, 48 per cent potash soluble in water;

All other fertilizers manufactured or imported for sale, including those mentioned in the foregoing list, provided their plant-food substance content is less than the amount specified, must be registered. All mixed fertilizer must be registered. The registration forms prescribed for the purpose may be had on application to the Seed Commissioner.

As under the old Act, each bag or package containing fertilizer must bear a printed tag or label, or the package itself may be branded, with the following information: the name and address of the manufacturer or importer; regis-

tration number of the registered fertilizer; the brand name of the fertilizer; and the guaranteed analysis. If the fertilizer is sold in bulk, this information must be stated on the invoice of sale. The new Act provides also that it must all be printed on one side only of the tag or bag, without additional information on that side.

The information of guaranteed analysis required differs from that under the old Act in that the percentage of nitrogen may be stated only under two heads, that is, water soluble nitrogen and total nitrogen. The terms "available" nitrogen and nitrogen equivalent to ammonia must not be used. On the other hand, if organic materials, such as hoof, horn, hair or refuse is present in the fertilizer, 80 per cent of its total nitrogen content must be soluble in neutral permanganate (A.O.A.C. Methods). Otherwise the percentage of these organic materials containing insoluble nitrogen must be stated in the information of guaranteed analysis. Phosphoric acid may be stated under two heads only, total phosphoric acid and available phosphoric acid, and potash only as potash soluble in water. In the case of basic slag or natural rock phosphate, or a mixture of both, the statement must also contain the percentage of fineness to which it is ground.

All fertilizer, whether bought on prescription or exempt from registration or registered, is subject to this labelling provision of the Act.

Another provision, not found in the old Act, prohibits the sale of fertilizer that contains any substance in sufficient quantity that would be poisonous to plant life when applied to the soil. This applies particularly to fertilizer that contains anhydrous borax.

The Act also gives the Minister of Agriculture power to make regulations deemed to be necessary in making effective any of its provisions, and to appoint an advisory board to recommend to him such regulations. This board has been appointed, and consists of

three representatives of the fertilizer manufacturers of Canada, three Canadian agricultural chemists, and three representatives of the fertilizer users.

At the first meeting of the board, held at Ottawa on July 10 and 11 last, the following regulations bearing on labelling and brand names, were recommended and have since been adopted.

Regulations adopted

"All the information required to be stated under Section 4, clause 1, of this Act shall be plain, legible and indelible.

"The tags or labels which bear the information required to be stated shall be printed in not less than 11 point print, or when the information is branded or marked on bags, barrels or other large packages, the printed characters shall be not less than one inch long, provided that on small packages containing ten pounds or less of fertilizer, the information printed thereon shall not be less than 11 point print.

"When the fertilizer is sold or offered for sale in the province of Quebec, the printing of the information required under Section 4 of this Act shall be done in the French language on one side of the tag, and in the English language on the reverse side.

"The information given in the statement of guaranteed analysis, as required under Section 4 of this Act, shall be set forth as follows:—

In the order as provided under Section 4 (1) of this Act;

The percentage of the plant food substance shall be printed, branded or marked directly opposite and to the right side of the name of the plant food substance.

"When a fertilizer contains only one of the plant food substances, nitrogen, or phosphoric acid, or potash, its brand name shall include the trade name of the fertilizer material, e.g., "Nitrate of Soda," etc., provided that when its plant food substance content is fortified with

another material containing one and the same plant food substance, the names of both the materials shall be included in the brand name, e.g., "Basic Slag and Florida Phosphate," etc.; or,

"When the fertilizer consists of one fertilizer material (not mixed with another) and is guaranteed to contain two or three of the plant food substances, nitrogen, phosphoric acid and potash, the brand name of the fertilizer shall include the name of the material, e.g., "Tankage," etc.; or,

"When the fertilizer is made by mixing two or more materials which contain different plant food substances, nitrogen, phosphoric acid and potash, the brand name shall not include the name of any one of the materials unless the names of all the materials are included.

"The brand name shall not include the name or other designation of any field or garden crop or group of crops."

Any person in Canada, who is affected by the Act or Regulations, has the right to place any matter bearing on the control of fertilizers before this board for consideration. Such persons may appear before the board in person or address the board through the office of the Minister.

Copies of the Act and Regulations may be had on application to the Publications Branch, Dominion Department of Agriculture, Ottawa.

Inspection

Inspectors appointed under *The Seed Control Act* and *The Feeding Stuffs Act* are responsible for the enforcement of *The Fertilizers Act* in their respective districts.

The interested public have the right to apply at any time to an inspector to take official samples from any fertilizer that appears to have been sold or offered for sale in contravention of the provisions of the Act; or, any person may take samples of fertilizer and submit them to an official analyst for official analyses,

and the certificate of the official analyst is *prima facie* evidence before the court. The samples must be taken in strict accordance with the sampling provision of the Act.

Applications for the service of inspection in the respective inspection districts should be addressed "Dominion Seed Branch," as follows:—

Maritime Provinces—Truro, N.S.

Quebec—Post Office Building, Quebec City.

Eastern Ontario—Ottawa, Canada.

Western Ontario—36 Adelaide St. E., Toronto.

Manitoba and Saskatchewan—173 Portage Ave. E., Winnipeg, Man.

Alberta and British Columbia—Calgary, Alta.

AGRICULTURAL LEGISLATION AND APPROPRIATIONS, 1922

DOMINION OF CANADA

A synopsis of the Acts relating to Agriculture passed at the 1922 session of the Dominion Parliament is given below, together with the details of the appropriations for Agriculture for the years 1921-22 and 1922-23 respectively.

Act to amend the Oleomargarine Act, 1919.—The time during which oleomargarine may be manufactured in or imported into Canada is extended from August 31, 1922, to August 31, 1923, and the time during which oleomargarine may be sold in Canada is extended from March 1, 1923, to March 1, 1924.

Act to Amend the Animal Contagious Disease Act.—This Act has been amended by changing the amounts that may be awarded as maximum values for livestock slaughtered under the Act. These values are now as follows:—

"In the case of grade animals, one hundred and fifty dollars for each horse, sixty dollars for each head of cattle, and fifteen dollars for each pig or sheep; and in the case of pure-bred animals, three hundred dollars for each horse, two hundred dollars for each head of cattle, and fifty dollars for each pig or sheep."

The amount of compensation granted in each case is two-thirds of the amount of the valuation. The effect of this amendment is to reduce the valuation

and compensation for animals destroyed for glanders, hog cholera, tuberculosis, and other diseases, to correspond more nearly than it has done with the reduced values of livestock since the war. It will also enable the money granted by Parliament for this purpose to be spread over a larger area and thus benefit a greater number of livestock owners.

The Fertilizers Act, 1922.—A full statement of the provisions of the new Act will be found in a special article in this issue.

An Act to regulate the sale and inspection of root vegetables.—This Act provides as follows:—

For the grading of potatoes offered for sale in Canada, 'Canada-a,' 'Canada-b' and 'Canada-c' qualities.

For the grading of Onions offered for sale in Canada, 'Fancy,' 'Choice,' 'Standard,' 'Boilers,' and 'Sample' qualities.

For the special marking of bags, closed barrels and closed crates or car-load shipments in bulk, of potatoes or onions.

For the establishment of standard definitions and grades for potatoes and onions.

For the obliteration of any marks on packages when used again.

For inspection, and how falsely marked packages may be dealt with.

THE AGRICULTURAL GAZETTE OF CANADA

For the establishment of a standard barrel for potatoes.

For the sale of vegetables by weight.

It prohibits the sale for human consumption of potatoes or onions so diseased or otherwise depreciated as to render them unfit for this purpose.

Fraudulent packing is forbidden.

No person shall sell or offer, expose or have in his possession any potatoes for

sale by the closed barrel unless such barrel is well and properly filled.

The powers of inspectors are defined, and penalties for violation of the Act are prescribed.

The provisions of the Act do not apply (a) to new potatoes when shipped between June 1 and September 30, inclusive; (b) to seed potatoes; (c) to green onions; (d) to potatoes or onions for export.

DOMINION AGRICULTURAL APPROPRIATIONS

	1921-22	1922-23
Civil Government.. . . .	\$ 689,075 00	\$ 780,455 00
Experimental Farms.. . . .	1,272,639 50	1,325,000 00
Entomology.. . . .	26,000 00	28,000 00
Administration and Enforcement of the Destructive Insect and Pest Act.. . . .	194,000 00	240,000 00
Dairying.. . . .	175,000 00	175,000 00
Cold Storage Warehouses.. . . .	26,000 00	51,000 00
Fruit.. . . .	145,000 00	157,000 00
Health of Animals, administration of the Animal Contagious Diseases Act, etc.. . . .	1,710,000 00	1,785,000 00
Publications.. . . .	34,500 00	28,500 00
International Institute of Agriculture.. . . .	10,000 00	15,000 00
Live Stock.. . . .	1,000,000 00	1,060,000 00
Seed, Feed and Fertilizer Control.. . . .	260,000 00	275,000 00
Administration of the Agricultural Instruction Act.. . . .	10,000 00	20,000 00
Grant, National Dairy Council.. . . .	3,000 00	3,000 00
Grant, National Horticultural Council.. . . .	.....	5,000 00
Stock Grazing and Feeding (Re-vote).. . . .	50,000 00	41,503 65
Total.. . . .	\$5,605,214 50	\$5,989,458 65

AGRICULTURAL INSTRUCTION GRANT, 1922-23

THE allocation of the grant made by the Dominion under *The Agricultural Instruction Act* to the provinces of Canada for the fiscal year ending March 31, 1923, is given below, the schedules of allotment as to the expend-

iture of the grant having been incorporated in the Agreements entered into by the Dominion Government and the governments of the provinces, in each case represented by the Minister of Agriculture.

ONTARIO

Agricultural Colleges and Schools

1. Ontario Agricultural College:

Salaries and expenses, additions to staff, maintenance.. . . . \$ 8,000 00

2. Agricultural School and Farm:

(a) Capital expenditure.. . . . \$89,000 00

(b) Administrative and teaching staff, maintenance, purchase of stock, machinery, repairs, services, expenses and equipment.. . . . 35,000 00 124,000 00

THE AGRICULTURAL GAZETTE OF CANADA

Instruction and Demonstration

3. Agricultural Representatives	\$139,603 26
4. Extension work in Household Science in rural communities.	1,200 00
5. Co-operation and markets, investigation of marketing conditions for Ontario crops, educational work in connection with the marketing of farm products, including organization of co-operative societies.	4,000 00
6. Demonstrations in connection with vegetable growing	3,500 00
7. Women's Institute work, including courses in cooking, sewing, etc.	2,800 00
8. Lectures on horticulture	1,000 00
9. Demonstration work on soils	7,200 00
10. Beekeeping.	1,000 00
11. Drainage work.	4,000 00

Elementary Agricultural Education

12. To provide for and to encourage the teaching of agriculture, manual training as applied to work on the farm, and domestic science in High, Public, Separate and Continuation Schools, and in Universities, to be available for grants, services, expenses, and equipment, and travelling and living expenses of teachers, inspectors and others in attendance at Short Courses or other educational gatherings, and to be paid out on the recommendation of the Department of Education.	40,000 00
	\$336,303 26

QUEBEC

Colleges and Schools of Agriculture

1. Grants and allowances,— Macdonald College, School of Agriculture, Ste-Anne de la Pocatière, Oka Institute.	\$ 75,000 00
2. School of Veterinary Science, building and extension.	5,000 00

Instruction and Demonstration

3. Animal Husbandry.	9,000 00
4. Poultry Husbandry.	18,000 00
5. Horticulture.	35,000 00
6. Dairying, educational work in cheese and butter-making.	5,000 00
7. Agricultural Representatives.	69,000 00
8. Seed Selection, clover plots and demonstrations.	9,000 00
9. Bee-keeping—Educational work.	7,000 00
10. Drainage.	6,000 00
11. Maple Industry—Maintenance of schools and allowance to students.	4,000 00
12. Short Courses and Lectures.	9,113 76

Elementary Agricultural Education

13. To promote the teaching of Agriculture in Academies, Rural and Normal Schools, Teacher Training, School Gardens and School Children's Exhibits.	10,000 00
14. To promote the teaching of Domestic Science in Academies and Normal Schools—Grants, lectures and inspection.	10,000 00
	\$271,113 76

MANITOBA

Agricultural Representatives.	\$12,000 00
Dairy Work.	7,000 00
Poultry Work.	5,000 00
Boys' and Girls' Club Work.	15,000 00
Short Course Work.	14,000 00
Home Economics.	14,000 00
Soil Analysis and Survey.	1,000 00
Bee-keeping.	4,000 00
Killarney Demonstration Farm.	4,000 00
Contingencies and Miscellaneous.	1,113 11

\$77,113 11

THE AGRICULTURAL GAZETTE OF CANADA

SASKATCHEWAN

College of Agriculture

Staff Salaries—Research and Extension Service.. . . .	\$19,209 49
Women's Work—Homemakers' Clubs.. . . .	7,500 00

Instruction and Demonstration

Demonstration Trains.. . . .	20,000 00
Agricultural Representatives.. . . .	6,209 50
Veterinary Short Course.. . . .	500 00

Elementary Agricultural Education

Agricultural Instruction in Public, High and Normal Schools, Household Science, Training of Teachers, Nature Study.. . . .	20,709 49
Grants to Schools operating departments in Household Science.. . . .	3,000 00
Expenses of officials at School Fairs.. . . .	3,000 00
Post Graduate Course in Agriculture, Agricultural Scholarships.. . . .	1,600 00
	\$81,728 48

ALBERTA

Schools of Agriculture.. . . .	\$40,000 00
School Fairs.. . . .	15,000 00
Women's Work.. . . .	8,000 00
Poultry Extension Work.. . . .	3,965 62
	\$66,965 62

BRITISH COLUMBIA

Seed work.. . . .	\$ 500 00
Silo Demonstrations.. . . .	500 00
Horticultural Demonstrations and Competitions.. . . .	1,000 00
Fruit Packing and Pruning Schools.. . . .	1,000 00
Poultry.. . . .	1,250 00
Dairy and Cow-testing.. . . .	9,000 00
Bee-keeping.. . . .	5,000 00
Boys' and Girls' Clubs.. . . .	1,250 00
Agricultural Journal and Publications Branch.. . . .	5,000 00
Pathological and Entomological Investigations.. . . .	1,500 00
Miscellaneous.. . . .	199 06
Agricultural Instruction in Public, High and Normal Schools, training of teachers, grants.. . . .	20,000 00
University of British Columbia, College of Agriculture, Extension and Investigation.. . . .	23,000 00
	\$69,199 06

NOVA SCOTIA

College of Agriculture—Interest and sinking fund, Science Building.. . . .	\$ 8,000 00
College salaries and maintenance.. . . .	25,000 00
Agricultural Representatives.. . . .	10,000 00
Short Courses.. . . .	1,000 00
Dairying.. . . .	7,000 00
Poultry.. . . .	1,500 00
Soils, Crops, Fertilizer, and Drainage.. . . .	3,000 00
Fruit Growing.. . . .	1,000 00
Women's Work.. . . .	5,000 00
Entomological Work.. . . .	7,500 00
Elementary Agricultural Education.. . . .	12,000 00
Contingencies.. . . .	716 69
	\$81,716 69

THE AGRICULTURAL GAZETTE OF CANADA

NEW BRUNSWICK

1. Agricultural Schools, salaries and maintenance.. . . .	\$ 1,000 00
2. Agricultural Representatives.. . . .	11,460 00
3. Bee-keeping.. . . .	2,800 00
4. Soils and Drainage.. . . .	5,500 00
5. Horticulture.. . . .	6,000 00
6. Short Courses.. . . .	1,250 00
7. Live Stock.. . . .	5,100 00
8. Dairying.. . . .	6,000 00
9. Poultry.. . . .	3,000 00
10. Entomology.. . . .	600 00
11. Agricultural Societies.. . . .	3,100 00
12. Women's Institutes.. . . .	6,500 00
13. Elementary Agricultural Education— Agricultural Instruction in Public, High, and Normal Schools, House- hold Science, Teacher Training, grants and allowances.. . . .	11,800 80
	\$64,110 80

PRINCE EDWARD ISLAND

Agricultural buildings,—equipment and maintenance.. . . .	\$ 1,050 00
Director and Agricultural Representatives.. . . .	4,300 00
Short Courses.. . . .	500 00
Drainage, Soils and Crops.. . . .	2,869 22
Live Stock and Dairying.. . . .	4,500 00
Poultry, Horticulture, Beekeeping and Co-operative Marketing.. . . .	500 00
Women's Institutes.. . . .	3,630 00
Elementary Agricultural Education, Agricultural Instruction in Public and High Schools, Training of Teachers, Allowances, Grants, Maintenance of Rural Science Department, Prince of Wales College.. . . .	11,900 00
Contingencies and Miscellaneous.. . . .	2,500 00
	\$31,749 22

THE IMPERIAL FRUIT SHOW, 1922

THE Imperial Fruit Show, 1922, will be held at the Crystal Palace, London, England, October 27 to November 4.

Collection of Entries and Entry Fees—The same arrangements as last year will be followed, and the Fruit Branch, Department of Agriculture, Ottawa, will receive all Canadian entries and collect all entry fees for the competitive British Empire and Overseas classes.

Closing of Entries—All entries and fees for the competitive classes must be in the hands of the Fruit Branch on or before September 25, in order that they may arrive in England not later than October 2.

Delivery of Exhibits—Exhibits must be delivered at the Exhibition Building,

Imperial Fruit Show, Crystal Palace, London S.E., not later than October 23.

Growers, Associations of Growers and Exporters: may exhibit in the Overseas Section. This will provide exporters shipping to the British market with the opportunity of taking advantage of the advertising involved in prize winning in this section.

Judging—The judging of the British Empire Section will be done by a Board of three judges—one expert box packer from Canada, one from the British Ministry of Agriculture and one neutral.

Information—Full information may be obtained on application to the Fruit Branch, Department of Agriculture, Ottawa.

PART II

Provincial Departments of Agriculture

THE AGRICULTURAL INSTRUCTION GRANT IN SASKATCHEWAN

THE Agricultural Instruction Act was introduced at a time when vast areas in Saskatchewan had been only a short time occupied, and a great deal of extension work in agriculture was necessary because of the fact that many of the pioneer settlers were unfamiliar with agriculture under Saskatchewan conditions. This imposed heavy responsibilities upon the College of Agriculture in extension work, in research work and in the training of workers for both of these lines. The administrative work of the Department of Agriculture also was greatly increased, while the Department of Education, with the increase of an average of one school district every school day for several years, was equally busy.

The advent of the Agricultural Instruction grant with the opportunity it gave for assisting these organizations in furthering their work was, therefore, an important event; and—needless to add—one that was much appreciated by those to whom the work was great and the labourers few. The late Dr. C. C. James and his successors very readily perceived our local problems and gave approval to our proposals for the use of the Federal grant in helping to meet them.

The grant was at first divided equally between the College of Agriculture and the Department of Agriculture, but later, with the development of special agricultural instruction under the auspices of the Department of Education, the annual increases in the grant were apportioned to the Department of Education until it received an amount equal

to the allotments to the Department of Agriculture and the College of Agriculture.

The following is a summary of lines of work financed from the grant in Saskatchewan:—

(a) College of Agriculture

Staff salaries, research, teaching, and extension;
Women's work, Homemakers' Clubs, etc.;
Post-graduate scholarships in Agriculture.

(b) Department of Agriculture

Instruction and demonstration in Animal Husbandry,
Dairying,
Field Husbandry,
Co-operative Organization;
Demonstration trains;
Veterinary short courses;
District Representatives.

(c) Department of Education

Agricultural instruction in public, high and normal schools;
Promotion of boys' and girls' clubs;
School fairs.

College of Agriculture

The use of the Agricultural Instruction grant by the College of Agriculture has been along the definite line of providing additional staff for the College in order that the institution would be able to train young men for important positions in agricultural work, such as agricultural representatives and teachers of agriculture in secondary schools. It was also understood that these men would devote a certain amount

THE AGRICULTURAL GAZETTE OF CANADA

of time to different forms of extension work, as well as giving attention to their duties in research and in teaching. About four-fifths of the \$27,000 appropriated to the College of Agriculture was spent for staff salaries and expenses. The remainder of the grant to the College was used for carrying on women's work.

The Homemakers' Club is the name of the organization through which extension work for women is carried on in Saskatchewan, and the supervision of the Homemakers' Clubs is a branch of the Extension department of the College of Agriculture. There are now some 150 Homemakers' Clubs, and the work of the Director includes a variety of duties in advising and assisting in connection with the management of the Clubs, the holding of meetings and a variety of technical questions in regard to homemaking.

For a number of years a short course for young girls from farm homes has been held at the University in June. Each agricultural society is entitled to send two girls, who receive board and lodging at the University and assistance from the Department of Agriculture in the payment of a portion of their railway fares. Circulating libraries are also operated by this branch of the Extension department in connection with Homemakers' Clubs, Women Grain Growers' organizations, etc.

During the past four years a portion of the grant has been reserved for Research Scholarships to be used by graduates of the College of Agriculture in further fitting themselves for work in agricultural research and instruction.

Department of Agriculture

The use of the grant by the Department of Agriculture has varied during the ten year period. At the outset a portion of it was used to provide additional men for field work in connection with animal husbandry, dairying and field husbandry, and in providing a staff for the Co-operation and Markets branch

during the first few years of its existence.

Officials of the Department are primarily charged with administrative duties, although it is frequently difficult to differentiate between educational phases of their work and those that are administrative. As an illustration of this may be mentioned the administration of *The Agricultural Aids Act*, under which sales of stock are made to farmers on credit terms and propaganda carried on by the branch to encourage the use of better sires.

The work in connection with dairying included the financing of a part of the programme for the Dairymen's Annual Convention, and extension work in promoting the better breeding and better feeding of dairy herds, the care of milk and cream on the farm, and means and methods of marketing.

In connection with Field Husbandry, the work originally included the supervision and direction of a large number of agricultural secretaries employed and financed by Rural Municipalities. It also included efforts to promote the use of better seed and in the identification of noxious weeds.

In connection with the Co-operative Branch of the Department, demonstrations were first made in the marketing of wool, and the methods were so successful that eventually the plan was adopted by The Canadian Co-operative Wool Growers, an organization of producers operating throughout the Dominion.

Stock, poultry and eggs are other products upon which co-operative marketing effort has been applied.

These phases of Departmental work are now financed solely from Provincial funds, so that an equivalent sum has thereby been released for other activities.

Demonstration trains have, with the exception of one year, been carried on since 1914. In this undertaking there has been co-operative effort between the railways, the College of Agriculture, the Department of Agriculture and, more

recently, the Department of Education. The railway companies have provided trains free of charge and operated them at their own expense. The cars have been equipped very largely by the College of Agriculture, and to a lesser extent by the Departments of Agriculture and Education. The staff was contributed chiefly by the College of Agriculture. The usual period of operation annually was five weeks. The trains made two stops a day, and the total number of persons reached by one of these trains in a season would average over 30,000. Means were thus provided for answering specific questions in connection with the farming industry.

A Veterinary Short Course is held each year under the direction of The Saskatchewan Veterinary Association, and assistance is given from the Agricultural Instruction grant to the extent of \$500 in furnishing an eminent veterinarian, who conducts clinics and demonstrates methods of conducting surgical operations.

Agricultural Representatives: At the outset a portion of the grant was used in paying salaries and expenses of four Representatives, but with the outbreak of the War these men enlisted for active service and the organization was temporarily suspended. This work is now being resumed.

Department of Education

As there are over 4,000 public schools in this province and agriculture is a subject of study for all the upper grades, the question of training teachers is a very vital one.

The immensity of the problem made it appear advisable to begin the work of agricultural instruction by appointing instructors in the Normal schools who would be able to give to the teachers in training somewhat of the agricultural point of view in the teaching of that subject in the public schools. Later this plan was extended so as to include the

placing of instructors in a number of the high schools from which a considerable proportion of the future teachers are graduated. The object of this, of course, was to react in a satisfactory manner upon the boys and girls in the public schools.

The Agricultural High School has not been introduced in Saskatchewan, and consequently the use of the grant insofar as the Department of Education is concerned consisted in the payment of salaries of specialists in connection with the normal schools, and later in giving grants to high schools employing agricultural teachers.

In regard to Household Science, similar work has developed. A special feature of these activities has been the three-week short courses provided at various centres, which resulted in the establishing of a group system whereby a number of contiguous districts have engaged a special Household Science teacher.

From its inception in 1909 the whole School Fair movement has been directed by the Department of Education, and special effort has been put forth to develop the Agricultural and Household Science phases of the work. In 1910 the organization and direction of boys' and girls' clubs was made a part of the work of the Department of Education because of the intimate relation of these clubs to the boys and girls attending the public schools. Last year 275 school fairs were held, and 62 centres have fully organized Boys' and Girls' Clubs. None of this work is subsidized by cash grants, but is directed by officials whose salaries and expenses are paid from the Agricultural Instruction grant. The fund is also used to supply judges for these Fairs. The Rural Education Association has developed as the best local organization to promote and conduct School Fairs and the Boys' and Girls' Clubs, since it secures and holds public interest on the part of parents and others.

AGRICULTURAL INSTRUCTION IN ALBERTA

Summary of Activities to Date

Schools of Agriculture

At the conclusion of the Dominion fiscal year on March 31, 1923, the Agricultural Instruction Act will have been in operation for a period of ten years. Results of the work accomplished under the provisions of this Act in the Province of Alberta have been particularly successful. The administrative work has been taken care of entirely by the Alberta Department of Agriculture. As far as possible an endeavour has been made to confine the work performed under the Act strictly to agricultural education. At the commencement of the operation of this Act, the Province adopted a policy whereby schools of agriculture were established in different parts of the Province. These schools were located on farms which are a half section in extent. Three schools were established in 1913 and three more in 1919. These schools have been operating successfully, having had a total attendance of 2,568 students. The courses for boys include instruction in all subjects closely related to agriculture, and cover a period of two years. There is also a course for girls in household science covering the same length of time. The funds received through the Instruction Act are used principally in the operation and maintenance of these schools.

District Agriculturists

Through the funds supplied from this source it has been possible for the Department to establish a system of District Agriculturists. Several men have been placed in different localities throughout the Province, and have done some effective work in directing the agricultural policy of the district in which they are working. Pig clubs, calf clubs and school fairs have been organized in a large number of places through the efforts of these men, aided by some of

the teaching staff of the schools of agriculture during the summer months.

Extension Service

Under the Institute Branch of the Department, short courses in agriculture for farmers have been held. These courses have extended over periods ranging from three days to two weeks. Several demonstration trains have been operated which were equipped with exhibits designed to give information respecting improved methods of agriculture and household economies. A staff from the Department accompanied each of these trains and gave lectures at stated periods each day.

Women's Work

Through the financial assistance rendered by the Instruction Act, a large development has been possible in Women's Extension work. At the time the Act was brought into force, the Women's Institute organization of the Province had just come into being. It has now developed to the point where there are about 400 local organizations with a membership of about 15,000 women. Extension lecturers and demonstrators are supplied to each of these institutes at least once a year. Short courses extending over periods of two weeks each are operated by the staff of the Department where such courses are applied for. These courses embrace such subjects as dressmaking, millinery, cooking, nursing, etc. The Women's Extension Branch also conducts a system of circulating libraries for the use of local institute organizations.

A retrospect of the work carried on through the assistance given by the Instruction Act, convinces one that this type of co-operation between the Federal and Provincial Departments of Agriculture is highly desirable from the standpoint of work actually accom-

plished. The Provincial Department has had the most courteous and considerate treatment from Federal officials at all times. The proposed programme of work has been discussed carefully on many occasions with the officer in charge. No difficulty has been experi-

enced in reaching a decision as to the exact work to be undertaken. The Province of Alberta sincerely hopes that provision will be made for the development of this work on an even larger scale than heretofore.

WOMEN'S CLUBS IN THE PROVINCE OF QUEBEC

AFTER learning the principles of domestic science and agriculture in domestic science schools and convents of higher teaching, the girls and young women of our rural districts in the province of Quebec are organized into clubs under the name of "Women's Clubs" (*Cercles de fermières*). The first of these clubs was established in 1915. There are to-day seventy clubs, including 4,740 French-Canadian farmers' wives and daughters, under the general supervision of Mr. Alphonse Désilets, B.S.A., whose headquarters are at the provincial Department of Agriculture, Quebec.

In seeking to promote the economic interests of mankind, the essential part played by woman and the influence that she exercises upon the vocation of children should not be forgotten. Under intelligent management by devoted nuns, the domestic science schools endeavour to influence women to remain on the farm. They do this by training dutiful wives, thrifty housekeepers and experienced helpers for the "man with the hoe." However, it is only a small number, as yet, of farmers' daughters who go to these centres of science and practical training. The majority of the women and girls in our rural districts have yet to be reached, and the women's clubs are the means by which this work can be done. The fundamental idea of this undertaking is to keep our population on the land, to protect it against the lures of the city that attract our rural youth, and to direct this youth towards its natural and normal vocation by

fostering a liking for family life, for farm life and for the parish or community life. This movement, which has for its motto "Cling to the home and to the farm," has therefore a double object: to attach woman to the home by indissoluble ties, by making pleasant and easy the accomplishment of her duties as housekeeper, wife and teacher, and to keep on the land our sons and daughters by making rural life more attractive. The Quebec Department of Agriculture gives a liberal assistance to local organizations that will take part in this useful, patriotic and social work.

The means employed by the clubs are practical, limited in number and well defined; the aim (a) to make more attractive and easier for the woman the accomplishment of her moral and material duties towards her husband, her children and herself; (b) to show her and her family how indispensable and how health-giving the work of the farm is; (c) to make her the champion and main support of the community organization, maintained in the peace and the love of the traditions that have safeguarded our race.

The accomplishment of this programme is entrusted to local councils of supervision, constituted of enlightened women—mothers of families or persons whose conduct and authority ensure sufficient influence for the success of this work.

The provincial Department of Agriculture gives material assistance through its domestic science division, supplying

THE AGRICULTURAL GAZETTE OF CANADA

a general director and teachers experienced in domestic science, in the care of children and in woman's work in agriculture. Each club receives from the Department an annual grant covering the expenses of administration and permitting the organization of competitions and similar work. A large quantity of vegetable seeds and flowers seeds, of eggs for hatching, of pure-bred fowls, of bee-hives and bee material are distributed annually by the Department, and encouragement is given to the reorganization of domestic textile industries for wool and flax.

On the other hand, the clubs organize courses in domestic science, cooking, sewing, hygiene, care of children, and nursing the sick. One day each month is set apart for studies. Agricultural community days are arranged as well as mother's days and all other manifestations likely to keep up the brotherly and patriotic sentiment in healthy religious tradition.

A general congress of women's clubs is held every three years; one was held

in 1919 and one is arranged for this year.

The clubs are supervised by the provincial councils, and they have an official organ in "*La bonne fermière*," a domestic science and agricultural review for women, which is published every three months.

The main provisions of the statutes are as follows:

Each club is administered by a Board of Directors composed of a president, a vice-president, a secretary, a treasurer, a librarian, a lecturer and two councillors.

All women and girls taking an active interest in agricultural work are eligible as members of the club, after being presented by the Board of Directors and accepted by the majority of the members of the Board. The annual membership fee is not less than fifty cents.

For the study and the diffusion of good methods of agriculture and domestic science, the members of the club divide into committees, each charged with the study and promotion of a special line of work.

THE ONTARIO VETERINARY COLLEGE

BY C. D. MCGILVRAY, V.S., M.D.V., PRINCIPAL

IN recognition of the importance to the livestock industry of ensuring the highest possible standards of animal health, the Ontario Department of Agriculture is establishing at Guelph an up-to-date and fully equipped institution for the purpose of training young men for the veterinary profession.

This institution, the Ontario Veterinary College, is affiliated with the University of Toronto, and is one of the oldest and most favourably known on the American continent. It has received students from all parts of the English-speaking world, and its graduates are highly regarded, many of them having attained considerable prominence. The

College buildings are new and modern throughout, with the best of facilities and equipment for scientific instruction. The purpose of the College is essentially that of a teaching institution for the proper training of students for a degree in Veterinary Science. The prescribed course consists of four college sessions and leads to the degree of Bachelor of Veterinary Science (B.V. Sc.), which is granted by the University of Toronto.

The College is at present accredited by the Department of Agriculture of Canada and the United States Department of Agriculture. Graduates of accredited colleges are eligible for appoint-

ment as veterinary inspectors in Canada and the United States, in compliance with the Civil Service Regulations, and to membership in the American Veterinary Medical Association, and to register and practice in the various Provinces and States in conformity with their requirements.

Inauguration of the College

The available records indicate that in the year 1861 the then Upper Canada Board of Agriculture considered it necessary to take steps to have inaugurated a suitable institution for the education and proper training of young men as Veterinary Surgeons. They wisely foresaw the needs and advantages of this to

Scotland, who had recently graduated with honours in veterinary science, as a suitable person to be entrusted with the founding of a veterinary college in Canada. As a result the Ontario Veterinary College was first established in 1862 at Toronto as a private enterprise under the direction of the late Principal Andrew Smith, F.R.C.V.S. For a few years the classes were conducted in the Agricultural Hall at the corner of Queen and Yonge streets. In 1869 a special building for college purposes was erected on Temperance street. The success of the school became assured from the beginning by a yearly increase in the attendance, exceeding expectations and requiring more adequate accommo-



Ontario Veterinary College.—Front elevation of the main building recently completed at Guelph, Ontario.

safeguard the health of farm animals, thus protecting and encouraging livestock development in the future.

The late Hon. Adam Fergusson, the Chairman of the Board, and the late George Buckland, Professor of Agriculture at the University of Toronto, were particularly interested in the matter. In furtherance of the project Professor Buckland visited Scotland and consulted Principal Dick of the Edinburgh Veterinary College. He recommended Andrew Smith, M.R.C.V.S. of Ayr,

and Scotland, who had recently graduated with honours in veterinary science, as a suitable person to be entrusted with the founding of a veterinary college in Canada. As a result the Ontario Veterinary College was first established in 1862 at Toronto as a private enterprise under the direction of the late Principal Andrew Smith, F.R.C.V.S. For a few years the classes were conducted in the Agricultural Hall at the corner of Queen and Yonge streets. In 1869 a special building for college purposes was erected on Temperance street. The success of the school became assured from the beginning by a yearly increase in the attendance, exceeding expectations and requiring more adequate accommo-

Establishment as a Government Institution

During the year 1908 the interests of Principal Andrew Smith in the College

were acquired by the Province of Ontario. It thus became a government institution to be continued as the Ontario Veterinary College under the direction of the Minister of Agriculture and to be maintained by annual appropriations from the Legislature.

The late E. A. A. Grange, V.S., M.Sc., was then appointed principal and continued in that capacity until the year 1918. The Hon. Nelson Monteith, Minister of Agriculture, the late C. C. James, B.A., LL.D., Deputy Minister of Agriculture, and Dr. J. G. Rutherford, C.M.G., then Veterinary Director General and Live Stock Commissioner for Canada, were largely instrumental in having the College taken over by the Government.

Subsequently, under the direction of the late Hon. James Duff, Minister of Agriculture, the Government erected a new and well equipped college building on University avenue, which was occupied during the year 1914.

Affiliation with the University

Incidental to the transfer of the College to government ownership and direction, the course was lengthened, and affiliation with the University of Toronto was arranged whereby certain graduates with matriculation standing could receive the degree of Bachelor of Veterinary Science. During the year 1919, under the direction of the Hon. George S. Henry, Minister of Agriculture, the Act respecting the College was amended by the Legislature as regards qualifications for the degree. As a result a more definite and closer affiliation with the University of Toronto was effected for conferring the degree, and its curriculum with matriculation was adopted leading to the degree of Bachelor of Veterinary Science, and for the degree of Doctor of Veterinary Science.

Expansion of Veterinary Science

With the incidental transition during the period of the World War, the rapid urban growth, the increased demand for

food-producing animals, the expansion of veterinary science and its field of usefulness, it gradually became apparent that the centre of a large city was in some respects no longer the best place for the College to fulfil its manifest obligations.

In this connection it is worthy of note that when veterinary colleges were first established the activities of the profession were largely directed to the horse in health and disease. The education and training of prospective candidates for the profession had to be conducted preferably at centres where the number of horses was the greatest and steadily increasing, as in large cities. Coincidentally, the other classes of farm stock, namely cattle, sheep, swine, and poultry, constituting the food-producing animals, have been increasing in importance, and present a much wider sphere of opportunity than formerly. Veterinary education, training and practice, though concerned as before with the horse, is confronted with additional demands and increasing obligations in connection with general live stock problems, in conserving the health of animals, controlling disease, safeguarding the public health against unwholesome food supplies, and the maintenance of a sanitary service to enable an export trade to be continued in live stock, meats, and allied food products. To meet the various exigencies it was decided to establish a new institution at a location providing for greater expansion and wider facilities than were available in the centre of a large city, the idea in mind being to retain urban advantages and in addition to secure closer contact with agriculture and animal industry.

The New College

After carefully considering the essential requirements of veterinary education, training and practice, the Government on the advice of the Hon. Manning W. Doherty, Minister of Agriculture, decided to establish a more adaptable institution at Guelph, in the centre of

one of the best live stock districts in Canada. Suitable grounds were provided and the erection of the new college buildings was begun during 1921, and their completion assured for the session commencing the first of October, 1922. The location, buildings and equipment combine in making what is generally considered to be one of the finest institutions of the kind on the American continent.

Since the college has been acquired by the Government and placed under the direction of the Minister of Agriculture, it has received a large measure of support and encouragement under each succeeding regime. It has been possible to develop a wider outlook and broader educational policies from this source, as well as from the University of Toronto with which it is affiliated.

Location of the College

The Ontario Veterinary College is favourably situated on "College Heights," at Guelph, Ontario, which is a leading educational centre, and the surrounding district is known as one of the best agricultural and live stock sections in Canada. The location is one that offers and combines all the advantages of the city with the attractions of suburban surroundings. The College is within easy walking distance of the centre of the city, and has the benefit of a good street car service. Guelph is a modern city with a population of about eighteen thousand, and is only forty-eight miles from Toronto and about twenty-five miles from Hamilton. It has a splendid train service and close railway connection with Toronto by the Grand Trunk railway, the Canadian Pacific railway, and the Toronto Suburban Electric railway.

The Ontario Agricultural College and Experimental Farm is also situated on "College Heights," and comprises about seven hundred acres of land with a large group of magnificent buildings. The Veterinary College directly faces the grounds and campus, which are generally

considered to be among the most beautiful on the continent. The well kept lawns, walks and drives, with the evergreens, ornamental trees and shrubbery all combine in creating attractive surroundings.

While the Veterinary College and the Agricultural College are separate and self-governing institutions, nevertheless their being in close proximity to each other affords many mutual advantages. The attendance of several hundred young men and women makes the social features of student life very congenial and provides for friendly rivalry in sports, athletics and other contests.

Grounds, Buildings and Equipment

The grounds are ideally located on "College Heights," fronting the main avenue known as the Brock or Hamilton road. The buildings are set back about one hundred feet from the road in front, which is paved and lined on each side with a row of large trees, making a very desirable avenue approach. The main building of the Veterinary College is a handsome new three-story structure fully modern throughout in arrangement, in facilities and in equipment. The exterior is designed in the "Modern Renaissance" style, and is particularly pleasing with grey sandstone and plum coloured tapestry brick facings. In outline it comprises a central portion one hundred and fifty feet in length, with two wings one hundred and thirty feet in length, extending on each side. Wide stone steps make an imposing entrance to the central portion, which is surmounted with a handsome cupola. A wide corridor extends the full length on each floor, and with the stairs and elevator permits ready access throughout. On the main floor are situated the executive offices, faculty room, assembly hall, library, reading room, class rooms, and museum. The ground floor has a students' entrance at each end connected by a wide corridor. On this floor are the students' sitting and recreation rooms, coat room, post

office, pharmacy laboratory, class room, dispensing room, instrument room, consulting office, clinical amphitheatre with surgical ward, and dressing room. The third floor contains the fraternal room, three class rooms, the Zoology, Histology, Pathology, Parasitology, Bacteriology, and Anatomical laboratories, with adjoining preparation rooms, staff offices and ward for small laboratory animals. All of the class rooms and laboratories are exceptionally well lighted and ventilated, and with the complete equipment and modern conveniences throughout provide many advantages for the comfort and well being of the student.

Class Rooms

There are six separate class rooms, each providing seating accommodation for over one hundred students. The lighting comes from the left side and rear of the student, thus avoiding any glare and shadow effects. Each room has ample black board facilities, and the seating is suitably arranged to enable the students to write lecture notes. Provision has also been made whereby use can be made in the lecture rooms of a projector and lantern for demonstration purposes, showing illustrations, lantern slides and microscopic preparations.

Laboratories

There are four large special laboratories assigned to practical work in Pharmacy, Anatomy, Zoology, Histology, Pathology, Parasitology, and Bacteriology.

The Pharmacy laboratory is on the ground floor adjacent to the clinical amphitheatre. It is conveniently arranged, well ventilated, suitably lighted, and individual benches with the necessary equipment are provided for the use of students. It is adapted for lecture and laboratory instruction, with accommodation for a class of about one hundred. A smaller adjoining room serves as a preparatory laboratory for

research work and for the compounding and dispensing of material required for class purposes.

The Anatomical laboratory occupies one of the wings on the third floor, and is considered to be one of the largest and most complete of the kind. The lighting, ventilation and sanitary arrangements have been specially considered making it very adaptable for anatomical studies and post mortem examinations. The floor is concrete, sloped to drains, the walls finished in hard cement, smooth surfaced, and the dissecting tables are of white enamelled metal. An elevator connects it with the ground floor, enabling animals to be easily and readily transported up or down as desired. A commodious dressing and wash room is also available for the use of students.

The Zoology, Histology and Pathology laboratory extends around part of the front and one end of the third floor. The Parasitology and Bacteriology laboratory is similarly arranged at the other corner of the building. As both of these laboratories are of the same design and arrangement they may be conveniently described together. Being placed at each corner, window light is available from two sides and, with a large skylight in the centre, a maximum of natural light is secured. Each laboratory provides accommodation for a class of over sixty students at a time and is arranged on the unit plan with individual bench accommodation. A complete laboratory outfit is furnished each student including microscope and other necessary apparatus used in the preparation of tissue sections, the mounting and preparing of slides and making of culture media. The general equipment is complete and modern in every respect including microtomes, paraffin baths, autoclaves, Arnold and hot air sterilizers, incubators, centrifuges, refrigerators, media cabinets, and other laboratory conveniences. Connected with each laboratory are two smaller laboratories

for the use of the instructors in the preparation of material and for research work. A small animal ward is conveniently located adjacent to the laboratories for research and experimental purposes.

Clinical Amphitheatre

The clinical amphitheatre is located in one of the wings on the ground floor. The seating is arranged in elevated sections providing a full view during demonstrations and operations. The equipment includes operating tables for large and small animals, restraining stocks and stalls. Hot and cold water is provided with wash basins and sinks conveniently placed. Connecting with the amphitheatre is a special surgical ward and a dressing room. The instrument room, dispensary and consulting room are also in direct communication, so that the whole arrangement is very complete.

Veterinary Hospital

The Veterinary Hospital is a substantial two-story building situated near the main college building. It consists of a central portion with projecting wings so as to provide separate sections for the different classes of live stock, and has accommodation for over forty animals. The sections for horses and cattle are situated at each end of the central portion and comprises both open and closed stalls to accommodate over twenty animals comfortably. The sections for sheep and swine are contained in the projecting wing and provide accommodation for over twenty animals. The section for small animals is arranged for on the second story with suitable kennels for dogs and cats. The stable fittings, lighting, ventilation, and drainage have been specially considered, in keeping with modern requirements. Outside yards and paddocks are available for the exercising of animals.

PROVINCIAL AGRICULTURAL LEGISLATION AND APPROPRIATIONS, 1922

ONTARIO

An Act to Aid in the Grading and Packing of Fruits.—Provision is made whereby a grant not exceeding twenty-five per cent of the appraised value may be made out of funds appropriated by the Legislature for that purpose to any association for acquiring or erecting buildings for the grading, packing and storing of fruits grown by its members. The maximum grant shall not exceed \$1,500, and the plans and location must be approved by the Minister of Agriculture. Ownership is vested in the association but buildings cannot be disposed of without the Minister's consent. This use of the buildings is allowed to outside growers, not members, on terms that may seem reasonable. An annual statement is to be submitted to the Minister. Repayment of the grant relieves

the association of all conditions and limitations imposed. The Minister is given authority to decide all matters of doubt or dispute as to the workings of the association or the interpretation of the Act.

An Act to Amend the Community Halls Act.—This amendment removes the condition under which a Hall or Athletic Field must be provided within the township in which it is vested. Cases have arisen, where because of the existence of a community park or a lake just outside the confines of the township, the above provision is desirable.

An Act to Amend the Ontario Farm Loans Act.—Subsection 2 of section 25 of *The Ontario Farm Loans Act, 1921*,

is amended by striking out the figures "\$1,000" in the second and fifth lines thereof, and substituting instead in each case the figures "\$2,000."

An Act to Amend The Agricultural Development Act.—Subsection 1 of section 10 of *The Agricultural Development Act*, 1921, is amended by adding at the end thereof the following clauses:

- (d) To pay off encumbrances, in which cases loans shall not exceed 40 per cent of the valuation;
- (e) For the purpose of providing tile drainage.

An Act to incorporate the Ontario Co-operative Dairy Products, Limited.—Producing dairymen and others in-

terested in the permanent progress of the dairy industry have for some time past felt and voiced the need for better marketing facilities for their products. In response to this sentiment, the Minister of Agriculture for Ontario, Hon. Manning Doherty, at the recent session of the Legislature, introduced a Bill to incorporate the Ontario Co-operative Dairy Products, Limited, and this Bill has now become law. The effect of this Bill is to put power into the hands of the producing dairymen to organize in such a way as to control their product from cow to consumer. It makes possible the organization of a large central selling company on a thoroughly co-operative, sane, business basis.

AGRICULTURAL APPROPRIATIONS

	12 months ending October 31, 1922	12 months ending October 31, 1923
Civil Government.. . . .	\$ 119,550	\$ 119,100
Agricultural and Horticultural Societies.. . . .	208,394	195,850
Live Stock Branch.. . . .	137,700	124,200
Institutes.. . . .	35,800	35,800
Dairy Branch.. . . .	184,800	157,300
Fruit Branch.. . . .	97,500	96,500
Agricultural Representative Branch.. . . .	167,000	167,000
Ontario Veterinary College.. . . .	36,060	37,060
Western Ontario Experimental Farm.. . . .	16,500	20,000
Miscellaneous.. . . .	130,450	118,950
Ontario Agricultural College.. . . .	590,960	576,680
	\$1,724,714	\$1,648,440

NOVA SCOTIA

Such agricultural legislation as was passed by the Provincial Legislature of the Province of Nova Scotia during its session of 1922 was confined to amendments to Acts already in force. These were as follows:

An Amendment to the Sheep Protection Act.—In cases where the owner of a dog destroying sheep is unknown or is unable to pay compensation, the amendment simplifies the procedure by requiring only one sheep valuer instead of three, as formerly, who shall make the inquiry and fix the amount of compensation. To safeguard this procedure, provision is made for the reviewing of

the case before a regular session of the county council in cases where there is dissatisfaction with the award of the valuer.

The Act for the Encouragement of Agriculture is amended so as to provide that the sum of \$25 shall be retained by the Provincial Treasurer out of the amount granted to county exhibitions. The amounts so retained shall constitute a fund from which grants may be made upon the recommendation of the Secretary for Agriculture, the Superintendent of County Exhibitions and the President of the Farmer's Association to assist county exhibition boards in

THE AGRICULTURAL GAZETTE OF CANADA

defraying deficits due to rain or other uncontrollable causes.

The Act for the Encouragement of Dairying is amended to allow Inspectors

appointed to enforce the provisions of *The Cream Grading Act* (now in force), free access to cream while in transit as well as when it arrives at the creamery or cream station.

AGRICULTURAL APPROPRIATIONS

	1920-21	1921-22
Agricultural Societies.. . . .	\$ 20,000 00	\$ 20,000 00
General Agriculture.. . . .	46,826 00	49,441 66
College and Farm.. . . .	48,000 00	44,309 79
	\$114,826 00	\$113,751 45

BRITISH COLUMBIA

The following legislation relating to Agriculture was passed at the first and second sessions of 1921 of the Legislature of the Province of British Columbia:—

Agricultural Act Amendment Act, 1921.—This amendment enables associations or societies duly incorporated and carrying on work of substantially the same character as that carried on by Farmers' Institutes to obtain stumping powder and explosives for land clearing and other agricultural purposes on similar terms and conditions as those that have been granted for many years past to Farmers' Institutes solely.

Animals Act Amendment Act, 1921.—This amendment makes provision for penalties in connection with the violation of the section of the Act relating to swine and stallions running at large, or beef bulls over six months old, except in the latter case where a special proclamation of a district shall have been made for bulls for a good beef type over one year old to be at large.

Brand Act Amendment Act, 1921.—The amendment in this case substitutes a new scale of fees for those formerly in effect.

Goat Breeders Protection Act, 1921.—This Act interprets the phrase "pure-bred" with regard to goats and makes provision as to persons keeping for service any bucks unless pure-bred. Exceptions of two and three year periods

from the commencement of the Act are provided for in the case of bucks which have pedigrees showing descent from pure-bred sires or pure-bred grandsires.

Mosquito Control Act Repeal Act.—This Act repealed the Mosquito Control Act of the year 1919. The former Act, which was also applicable to gophers, was not found to be workable in practice, in the case of mosquitoes owing chiefly to the large areas involved which would require drainage and considerable expense by the Public Works Department for which the local assessment provided in the Act would not have produced sufficient funds to finance the project. Two gopher control districts had been formed under the Act in the Slokan valley but no action had been taken.

Apiaries Act Amendment Act, 1921.—The chief interest in this amendment lies in the deletion of the clause in the Act of 1919 which provided for the annual registration of beekeepers and the payment of a graduated fee from \$1.50 to a maximum of \$5. This regulation had given rise to considerable irritation amongst large numbers of the smaller beekeepers, and the revenue produced therefrom did not have a very material bearing on the total expense involved in the extra number of inspectors appointed.

Co-operative Associations Act Amendment Act, 1921.—This amendment re-

THE AGRICULTURAL GAZETTE OF CANADA

peals the section in the original Act dealing with the distribution of profits of a co-operative association, the chief feature being the setting aside of not less than 10 per cent of the net profits each year as a reserve fund.

Goat Breeders Protection Act Amendment Act, 1921.—The amendment is a rectification of an error in the original Act, in which the singular person was used, thereby failing to cover the maternal ancestors.

AGRICULTURAL APPROPRIATIONS

	1921-22	1922-23
Minister's Office.. . . .	\$ 12,940 00	\$ 13,190 00
General Office.. . . .	34,996 00	38,176 00
Horticultural Branch.. . . .	93,540 00	104,712 00
Live Stock Branch.. . . .	73,462 00	67,472 00
Statistics.. . . .	4,720 00	4,520 00
District Agriculturists, etc.. . . .	16,270 00	16,270 00
Workshop and Shipping Office.. . . .	3,200 00	3,180 00
Miscellaneous Grants, etc.. . . .	149,150 00	132,150 00
Total.. . . .	\$388,278 00	\$379,670 00

PRINCE EDWARD ISLAND

One Act relating to Agriculture was passed at the last session of the provincial legislature, namely an amendment to the *Act to incorporate the Prince Edward Island Dairy Association*. The amendment in question provides that all cream delivered to a creamery must be graded and paid for according to grade. Three grades are admitted, i.e., special,

first and second. Creameries are required to pay a premium of not less than two cents per pound butter fat for special grade cream, and of not less than three cents for first grade. Dairy inspectors are empowered to take test samples of cream either at the producer's farm or in transit or at the creamery and to examine and retest.

AGRICULTURAL APPROPRIATIONS

Departmental expenses and contingencies.. . . .	\$ 2,950 00
Printing, Stationery, etc..	1,000 00
Exhibitions and Live Stock Judging.. . . .	10,000 00
Farmers' Institutes and Educational Work.. . . .	4,000 00
Dairying, Poultry and Field Crops.. . . .	1,550 00
Vital Statistics.. . . .	1,000 00
Agricultural High School and educational work.. . . .	4,000 00
	\$24,500 00

NOTE.—For the agricultural legislation and appropriations of the province of Quebec, see page 227, May-June issue. For the provinces of New Brunswick, Saskatchewan, Alberta, and Manitoba, see pages 307-313, July-August issue.

SUMMER COURSES IN AGRICULTURE NOVA SCOTIA

THE Nova Scotia Department of Agriculture and Agricultural College have in the past conducted short courses at the College and winter short courses at some of the larger centres here and there over the province, but never before has there been any serious endeavour to carry these out into the country.

This summer, between June 23 and July 7, short courses were carried on at twelve points in Cape Breton. The method followed was somewhat after the Chatauqua plan, one group of lecturers and instructors arriving on the first day and another on the second.

On the first day Principal Cumming, W. A. MacKay, Dairy Superintendent,

J. P. Landry, Poultry Superintendent, gave two lectures or demonstrations each, the evening session concluding with motion pictures of an educational character. On the second day at each place Professor Trueman gave a demonstration of live stock judging, from ten o'clock until noon. In the afternoon, Professors Trueman, Harlow and Cunningham lectured on various live stock and agricultural problems. In the evening lectures were given along similar lines, concluding, as on the first day, with motion pictures illustrating farming and stock raising operations.

In addition to these subjects, Miss Macdougall, Superintendent of Women's Institutes, and Miss Elizabeth Ellis, her assistant, conducted special courses of instruction for women, during the morning and afternoon of each day.

The attendance at all but two points was of a record character, reaching on several occasions upwards of 400 persons. The average was 250. Interest in practically every district visited ran high and full advantage was taken of the opportunity to gain useful information on farming problems. The whole venture is regarded by those who had it in hand as an unqualified success.

In the opinion of Dr. Cumming and his associates, perhaps the most significant factor in efforts of this kind is the presence or absence of a community hall. Again and again the benefits of such a meeting place appeared. It was equally evident that communities lacking such facilities were suffering from a serious handicap. At Boisdale, for example, the people are very fortunate in possessing

a splendid two-story community hall, capable of accommodating four hundred or more people, and built upon simple but effective architectural lines. It was easy to conduct a short course in such a building and gratifying to learn that the hall provides opportunity for numerous social, educational and business functions, for which facilities are entirely lacking in many communities. It is not to be wondered at that there is a lack of community and co-operative spirit in localities where there is no building large enough to accommodate any kind of representative meeting, except the various churches, which rightly are reserved for their special purposes.

Dr. Cumming was emphatic in his opinion that, whether it be viewed from a social, educational or business standpoint, no greater contribution can be made to the welfare of many communities visited than the erection of a hall of sufficient capacity for all the residents of the locality to meet together from time to time for one or all of the above purposes.

Everywhere it was apparent that leadership is a large factor in farming communities. Where there was good leadership the meetings were invariably large and reports of development and progress were inspiring. Sometimes leadership is supplied by the church, sometimes by the farmers themselves. Whatever the source, it was evident that even with no greater natural advantages, a community that is being well led is making progress much in advance of those which lack in this respect.

SASKATCHEWAN BETTER FARMING TRAINS, 1922

FROM every point of view the Saskatchewan Better Farming Train of 1922 was an unqualified success. The attendance was large throughout the tour and a keen interest was taken in the exhibits and lectures.

Much interest was taken in an exhibit of soil samples in the Field Husbandry car, showing the effect of continuous cropping in exhausting the humus and fibre content, and also the same soil with fibre restored by the

THE AGRICULTURAL GAZETTE OF CANADA

growing of alfalfa, brome, or sweet clover, a valuable demonstration of the proper way in which to combat soil drifting. The live stock lectures dealt with the importance of using good sires for every kind of stock. The dairy lectures emphasized the importance of cow-testing. The other departments dealt with Poultry, Farm Engineering and Mechanics, Household Science, School Hygiene, Boys' and Girls' work, Tree Planting and other subjects. Many instructive exhibits were provided in the various cars comprising the train.

Better Bull Train

Seventeen thousand persons attended the meetings of the Better Bull train. This attendance far exceeded that of last year when the first train of this kind in Western Canada, and probably on the American continent, was operated. It was run under the joint auspices of the Department of Agriculture and of the Canadian Pacific Railway, which furnished and operated the train entirely free of charge. Sixty stops were made during the tour.

The train ran over the C.P.R. lines northwest from Moose Jaw to Kerrobert and Macklin, returning by way of Saskatoon to Regina. The Agricultural Societies of the districts visited did the advertising and gave much assistance; the University sent a car of pure bred

cattle, chiefly females; the Moose Jaw Live Stock Exchange sent an exhibit of butcher steers to illustrate the market classification, and of hogs to show the new grading which will soon be in effect. The Cattle Breeders' Association had a representative on the train throughout the trip who assisted in sales and in lecturing.

The objects of the train were to emphasize the necessity of diversified farming, and to improve the various kinds of live stock by better breeding, better feeding and better marketing. The necessity of better breeding was illustrated by an exhibit showing how successive generations can be improved by good pure bred sires. The growing of forage crops was taken up. Lectures were given to boys and girls on breeds and types of farm animals, and moving pictures were employed.

From three to five cars of pure bred stock were carried for sale under *The Live Stock Purchase and Sale Act*. In all 62 head of pure bred bulls were sold, including representatives of all the popular breeds both for dairying and beef purposes. Thirty-nine bulls were taken in exchange, and of these, nineteen were sent to the Central Stock Yards and sold at butcher prices. The train also assisted in getting farmers together to exchange aged bulls, thus avoiding unnecessary outlay in purchasing new ones.

SHORT COURSES AND BOYS' CAMPS, SASKATCHEWAN

BY J. G. RAYNER, DIRECTOR EXTENSION DEPARTMENT, UNIVERSITY OF SASKATCHEWAN

THAT there is a strong and earnest desire throughout the province to discuss better methods of farming is clearly evidenced by the very large number of applications for short courses and lectures in agriculture received last winter by the Extension department of the Agricultural College at Saskatoon.

The Extension department conducted ninety-nine short courses in agriculture throughout the whole province, during the months of December, January, February, and March. Each of these courses was of one, two, or three days duration. As a rule, two lectures for farmers were given during the afternoon of each day,

and a general public lecture was given in the evening. Occasionally lectures were also given in the forenoon, but as a rule, the morning lectures were not so successful. At the evening lectures, either educational films were shown by means of a portable motion picture machine which the lecturers carried with them, or lantern slides were thrown on the screen to better emphasize what the speaker was discussing. Some of these courses were conducted at quite a distance from the railway, in one case 45 miles and in another 38 miles. Under these circumstances, storage batteries were taken out to the meeting places, and in this way a good safe light was available, making it possible to operate the motion picture machine.

Balanced farming, economy in production, high quality of product were some of the points emphasized. At all the courses it was made evident that western farmers must grow some forage to hold and improve the soil and keep some stock to profitably use the forage.

The lecturers were practical farmers, many of them with agricultural degrees, and all of them experts in certain branches of agriculture, such as live stock husbandry, dairying, grain and forage crops, poultry, horticulture, and forestry.

The attendance and general interest at these courses emphatically showed that many are anxious to break away from the old methods of farming, and are looking for a surer, safer, saner, more business-like system than the old method of growing wheat until the soil became exhausted or blew away.

In all, ninety-nine courses were conducted at which 257 meetings were held. The total attendance was 18,877; the average attendance at each meeting being 74. Often the capacity of the hall was the limiting factor on the number that could attend.

Farm Boys' Camps

The great interest shown in other years in the farm boys' camps held in

connection with the Regina and Saskatoon Industrial Exhibitions, under the direction of the extension department of the University of Saskatchewan is leading to a considerable widening of the work. The extension department of the university, with the co-operation of the exhibition boards and assisted by the Government, inaugurated the first camps at Regina and Saskatoon in 1915. The camps have been continued since then, and have grown continually in attendance and interest. This year five farm boys' camps are being held instead of two, namely at Regina and Saskatoon, as previously and at North Battleford, Melfort and Yorkton, in addition.

In the camps this year, teams of five boys, representing the agricultural societies of their respective communities, will take part in stock-judging contests. Each team will be under the care of an adult supervisor. The camps this year will last for three days and an extensive programme of contests, athletic events and educational work will be arranged for the entrants. The Y. M. C. A. organizations in the cities and towns will manage the physical programme for the boys, which will include games and sports. The educational work, as formerly, is in charge of the officials of the University Extension department.

Farm Girls' Convention

The Sixth Annual Convention of the Farm Girls of Saskatchewan was held at the University on June 6 to 9. The programme was planned to meet both practical and cultural demands of rural life, the practical being always presented as a means to an end; all calculated more to inspire than to present a great deal of information.

Much attention was paid to nutrition as the great essential of perfect health, with physical exercise, fresh air and proper sanitary conditions as contributing factors. The provincial Bureau of Health co-operated, and the Public Health Nurse emphasized these princi-

THE AGRICULTURAL GAZETTE OF CANADA

ples and gave some practical demonstrations on the care of the sick. A trip to the University kitchen garden was a practical demonstration of the possibilities of the farm garden in providing many of the necessities for proper diet and for affording variety. On this trip the growing of trees and shrubs and the

beautifying of farm surroundings was shown to be possible on the prairies. Classes in millinery and dressmaking were conducted, and swimming, physical exercises and folk-dancing occupied the evenings. The delegates report the proceedings to the organizations they represent.

ALBERTA PURCHASES FINE BULL

WHAT is stated to be one of the finest young Holstein-Friesian bulls on the American continent, has been purchased by the Alberta Department of Agriculture, for the Holstein herd at Stony Plain demonstration farm, which will later be moved to the government farm at Halfway House, near Edmonton. This bull, Sir Sylvia Car Born, aged a year and a half, was purchased from the herd of Senator A. C. Hardy, of Brockville, Ontario, and is the product of a long line of noted ancestors which have held world's records for milk and butter production.

The dam of Sir Sylvia is Pietje Car Born Dekol, No. 330771, and has a record of 38.77 pounds butter and 760.9 pounds of milk in seven days, and 6,201 pounds milk and 304.79 pounds butter in 60 days. The sire is Champion Echo Sylvia Pontiac No. 154779, known today as one of the outstanding breeding bulls on the continent. He has already 27 A.R.O. daughters, including Lady Waldorf Sylvia, with a record of 34.45 pounds butter in 7 days, and in 305 days

of 19,945 pounds milk and 903.14 pounds butter, as two year old. Another two-year old daughter, Echo Sylvia Bell, produced 31.14 pounds butter in 7 days, and another, Sylvia Pauline Echo, produced 30 pounds butter in 7 days. The dam of Champion Echo Sylvia Pontiac is the celebrated May Echo Sylvia which holds the world's records in butter and milk production for 7, 30, 60, and 100 days. Her record for 7 days is 1,005 pounds milk and 41 pounds butter; for 30 days it is 3,767.30 pounds milk and 169.72 pounds butter; for 60 days it is 7,927.10 pounds of milk and 323.32 pounds butter; for 100 days it is 12,899.80 pounds of milk and 505.34 pounds butter. The sire of Champion Echo Sylvia Pontiac, or the grand-sire of the new Alberta bull, is Spring Farm Pontiac Cornucopia No. 77172. His dam, K.P. Pontiac Lass, had a record of 44.18 pounds butter in 7 days. The half-brother of Champion Echo Sylvia Pontiac, the sire of the new bull, was purchased some years ago by the Carnation Milk Company for \$106,000.

PART III

Agricultural Education and Related Activities

TREE PLANTING ON PRAIRIE SCHOOL GROUNDS

BY NORMAN M. ROSS, CHIEF OF TREE PLANTING DIVISION, DEPARTMENT OF THE INTERIOR, INDIAN HEAD, SASK.

THE casual observer travelling over the prairie provinces, when approaching the average rural school, is almost invariably impressed by the bareness and generally uninviting appearance of the buildings and the surrounding grounds.

Though there are exceptions, the school building itself usually lacks any distinctive features of construction. A cheap shed or stable, placed fifty or perhaps a hundred yards behind the schoolhouse, and a couple of outbuildings, usually a very prominent feature of the landscape, placed on an area comprising from a half to two acres of bare level land, sometimes surrounding by a fence, not always in a very good state of repair, would be a fitting description of at least 60, perhaps 80 per cent of the rural prairie schools. Hardly an environment to inspire the young mind with high ideals or assist in the development of a sense of beauty.

In a new country, where the settlers are struggling generally to become established, and with but little money available for purposes other than actual necessities, one cannot expect to find conditions very much different to what they are. In all the prairie provinces, however, there are large districts which have been settled for a number of years where the farmers are well established and comparatively well-to-do, with good houses and farm buildings. In such districts one would naturally look for improvement in the general appearance of the rural school in keeping with the development of the neighbourhood. In

many cases in these older districts, new schoolhouses of a more pretentious character have been built, but, generally speaking, there is seldom any attempt made to beautify the surroundings. In some cases there are evidences that a few trees had been planted, but have since been neglected, and remain only as stunted or dying bushes, detracting from rather than adding to the general appearance.

It must be admitted that it is most desirable from every standpoint that more attention should be given to making the rural prairie school surroundings more attractive, especially in such districts where there is absolutely no natural tree or shrub growth. There are, here and there, exceptions to the general rule, where one finds a thrifty, well cared for shelterbelt, perhaps supplemented by groups of shrubs, a neatly kept hedge and flower beds. If inquiry be made in regard to such successful plantings, it will almost invariably be found that either a neighbouring farmer, who possibly may have been a trustee for a number of years, has personally looked after the planting and actual upkeep of the grounds, or that the same teacher has had charge of the school for several seasons, and, having a particular aptitude for and some knowledge of tree culture, has through his individual efforts, both by personal labour and by keeping the matter before his trustees, succeeded in getting the grounds planted and kept in an attractive condition.

THE AGRICULTURAL GAZETTE OF CANADA

In dealing with this question, it must be realized that in order to grow trees and shrubs successfully under prairie conditions, the ground must first be carefully prepared at least a year in advance of planting. After planting, especially in the case of narrow belts and small groups, continual subsequent cultivation is essential, otherwise grass and weeds will soon work in among the trees, robbing them of moisture, and in a very short time the trees will die out. To be effective all work of this nature must be done at the proper time, which is usually just when farmers are especially

is changed almost annually and no single person has any sustained interest or authority. In the developing of tree planting, this is a very important point, as no successful results can be expected without more or less continuity of plan, and supervision exercised by one or perhaps two individuals.

As a general rule the area of ground surrounding the rural schools is too small to permit of much planting, and at the same time, leave a sufficient area for playgrounds, stable room, etc., and when the buildings are first placed on the property no thought, apparently, is



Typical of the bare and unattractive surroundings of the average rural school on the Prairies.

busy getting in their crops, and it is always a difficult matter to find local farmers who are willing to leave their own work during the busy seasons to plant and cultivate a few trees on the school grounds. We understand that trustees themselves are not permitted to receive remuneration for any work they may do with their own labour and teams on the school grounds, and it is often very difficult to secure other labour in the immediate neighbourhood. The chief handicap, however, is due to the fact that the personnel of the school boards

given to the subsequent laying out and beautifying of the grounds.

The Tree Planting division of the Forestry Branch has always been anxious to assist in the planting of these rural school grounds, and a very considerable amount of material has been supplied for that purpose, but the results have been anything but encouraging.

In Alberta, we have supplied trees to 97 schools; 31 of which are comparatively recent applicants of the 66 older plantings, reports obtained from our inspec-

THE AGRICULTURAL GAZETTE OF CANADA

tors show only 20 per cent good, 20 per cent fair, and 60 failure, weedy and neglected. About 80,000 seedlings have been supplied to these 97 schools.

In Saskatchewan, we have on our lists 676 schools, of which 486 have received trees and 144 are new applicants this season. Of 123 school plantations inspected last summer 53 per cent were well cared for, 27 per cent fair and 20 per cent neglected. The officials of the Department of Education in Saskatchewan seem to be giving this matter far more attention than is shown in either Alberta or Manitoba, which accounts for the very much larger number of applications from that province. A few years ago, the Provincial Department of Education undertook to encourage school planting, and arranged for a special inspection of all school grounds before recommending any applications to our office. The inspection and applications are handled through the office of the

Director of School Agriculture. While the results under this system are very much better than when the Forestry Branch treated with each school independently, there is still room for very much improvement. Conditions, however, cannot very well be remedied unless more money can be made available for the actual financing of the planting operations and the subsequent upkeep of the tree belts.

In Manitoba, only 31 schools have been supplied with trees, and at present only 6 schools are on our inspection list.

The problem of successfully planting the grounds of the prairie schools is not an easy one to solve. It is a line of work that should receive every possible encouragement, but success depends entirely on a proper organization to handle the work, more or less continuity of supervision, and sufficient funds to properly finance each individual operation.

THE PRINCE EDWARD ISLAND AGRICULTURAL AND TECHNICAL SCHOOL

BY VERNON CROCKETT, PRINCIPAL

THE second year of the Prince Edward Island Agricultural and Technical School, Charlottetown, which concluded in the spring of 1922, was a most successful one. The enrolment was double that of the year previous and the attendance was very regular.

A number of changes had been made in our courses of study, and the work was carried on in three separate divisions—a matriculation course for students who intend to take four years at one of our agricultural colleges; a full agricultural course for students who intend to follow farming as a calling, and a motor mechanics course for students who wish to specialize in that department. The subjects taken in the matriculation course are English,

French, and History, Mathematics and Chemistry; in the agricultural branch, Live Stock, Field Crops, Poultry and Dairying, Motor Mechanics, Carpentry, Blacksmithing, English, Arithmetic, Civics, Economics, and General Science. The subjects taken in the Motor Mechanics course are Motor Mechanics, Blacksmithing, Wood-working, English, and Arithmetic.

Our students come from every section of the province. In individual attainments they vary considerably. This variation is due to difference in age, difference in aptitude, difference in early training. To bring together half a hundred young men of such unequal attainments, and to subject them to such a course of training as will enable them to develop their latent energies, and dis-

cover their latent possibilities is no easy matter. Our success is due to a variety of causes, but particularly to the students themselves. They applied themselves zealously and enthusiastically, and the amount of theoretical and practical work they have been able to cover in the short period of five months is indeed remarkable. Patient instructors, pleasant surroundings, up-to-date equipment and facilities did the rest.

The certificates awarded in the various courses were as follows:—

Matriculation Course 3

Agricultural Course

First-Class Certificates 10

Second-Class Certificates 7

Third-Class Certificates 3

Motor Mechanics

First-Class Standing 10

Second-Class Standing 3

In making awards, class work counts 20 per cent, practical work 40 per cent, and written examinations 40 per cent.

A word about the different subjects on our course would not be out of place. The work in our main subjects, Live Stock and Field Crops, has been considerably extended this year. Besides the regular lectures and class room demonstrations, experiments of a very valuable kind were carried on with the dairy herd at the school dairy barn. Problems in feeding, care and management, and the keeping of records were taken up in a very practical manner and excellent results were achieved.

The dairy industry is fundamental in the development of our province. The importance of this industry cannot be over-estimated, and this is the reason why an up-to-date, fully equipped cheese and butter plant is being operated at the school. The new word in the dairy industry is standardization. The world's markets are demanding milk products of standard quality, and we must either produce the goods or go out of business so far as the open markets are concerned. This makes cheese and butter manufac-

turing a business for experts. To get standard products on the markets every part of the manufacturing process must be watched with the closest attention. That is why we try to give our students an insight into every phase of the business—from the production of the raw material to the consumption of the finished products, because eventually, if we wish to reap the full benefit to be derived from the dairy industry, all this work of production and manufacturing and marketing must be done co-operatively; and these students of ours will be active members in these co-operative societies. This is the way they did it in Denmark, and Denmark attributes her outstanding position in the dairy world to the organization and successful operation of her agricultural high schools.

Another department in which we take considerable pride is Motor Mechanics and Blacksmithing. The application of motor power—the car, the tractor, the gas engine—to farm operations has rendered some form of technical instruction imperative. This school through its motor mechanics department is able to meet this demand.

The amount of motor equipment destroyed every year in this province through lack of knowledge of the mechanical and technical principles involved would more than meet the whole of the expenses of operation of this vocational school.

This year notable advances have been made in the farm carpentry department. Particular attention is given to the use and care of tools. Building construction, the use of concrete, the making of models and useful articles of furniture are among the problems that have engaged the attention of our wood-working students.

Just here I want to say something about our physical training, as both these departments are in charge of the same instructor. So important do we consider physical training in any scheme of all-round development that we make

it an essential part of our daily programme. At this time when there is a tendency to throw off all restraint and to chafe under restrictions the disciplinary value of physical training in connection with all our educational work cannot be too strongly emphasized.

Space forbids my referring to the other subjects on the course: English, Arithmetic, Civics, Economics, and General Science. Here we attempt to bridge the gap between the general work of the elementary school and the work of the vocational school proper. In English special emphasis is placed upon reading, writing, oral and written composition. Our object is to develop freedom in the use of language and to foster a love for good wholesome literature. We find our literary and debating society a valuable aid in this direction. Through our civics department we aim at giving useful training in good citizenship.

As regards economics: the successful farmer is a student of economics whether he knows it or not. More attention is being given to this subject than ever before in the world's history. Practically all the ills of the world are due to economic causes, and it seems to me that an intelligent appreciation of the economic laws governing the production, distribution and consumption of wealth

would put an end to much of the unrest, the bitterness and the foolishness which characterizes our handling of economic problems at the present time. I should like to see a practical course in economics taught in every educational institution in the country.

The outline of courses for next year is as follows:—

(a) A matriculation course for students who wish to take the four years at one of our agricultural colleges.

(b) An advanced course in agriculture for students who have taken the first year course, or for students whose scholarship would enable them to profit by the instruction given.

(c) An elementary course in agriculture for all students over fifteen years of age.

(d) A motor mechanics course for students who wish to specialize in this subject.

(e) A course for lobster packers and factory operatives.

(f) A course in household science for girls.

(g) Night classes for city students.

(h) Short courses (two weeks) in live stock, field crops, motor mechanics, cheese and butter making.

(i) Course for cheese and butter factory operatives.

A HIGH SCHOOL POULTRY PROJECT

BY JEAN THOMPSON, HIGH SCHOOL, CHILLIWACK, B.C.

In the issue of *The Agricultural Gazette* of March-April, 1921, there appeared an article by Mr. J. C. Ready, District Supervisor of Agricultural Instruction at Chilliwack, B.C., outlining a number of projects in agriculture then being undertaken at the Chilliwack High School for the first time. Criticisms, favourable and unfavourable, were presented in the succeeding issue. The report of one of the students who undertook the poultry project is given below, and will be read with interest in this connection.—*Editor*.

ON the first of January, 1921, the writer was attending Chilliwack High School and undertook to keep the cost records of the home flock of poultry during the year as a home

project in connection with the agricultural course which forms part of the regular High School work. The distance from home to High School was so great that it was necessary for the writer to

remain in town four nights of each week. Arrangements therefore were made with the person who had charge of the poultry to keep the data during periods of absence.

The Flock.—The flock consisted of two pure breeds, two White Wyandottes and thirty-eight Buff Orpingtons.

The Equipment.—The main building is 10 by 24 feet with three smaller pens in connection to be used for breeding, incubation and rearing purposes. The buildings have a southern exposure and are well protected from the north eastern winds by a bank. The buildings are of the shed roof type, are constructed with one ply of ship-lap, and have a strip of cotton over an open front for ventilation. All the buildings are built on skids so that they may be moved if desired. There is a run of approximately 2,000 square feet in which the birds were confined for a short period in the spring while the crops and garden were getting a start. For the rest of the year they had free access to the orchard. Here the trees afforded them shade during the hot summer days. In bulletin No. 89 by F. C. Elford, Dominion Poultry Husbandman, this appears to be a generally approved method of providing health-giving exercise for the birds. No changes were made in the equipment, housing, yard or runs during the year that would affect the results.

Incubation.—Natural incubation was the method used. The heavy breeds of poultry such as the Buff Orpingtons make patient and persevering sitters and excellent mothers. For the nests, boxes of fair size were used. In the bottom of each a large sod covering the entire bottom to a depth of several inches was placed and a hollow made for the nest. Fifteen eggs were allowed to each hen. These eggs were carefully selected as regards shape and size. The nests were placed in a pen where the sitters would not be disturbed by other hens.

About 150 chickens in all were hatched and for this small number the

system of natural incubation seems to be the best to follow according to the bulletin referred to above.

During the year, a setting of eleven duck eggs was received without charge, from which eight ducks were hatched and six were raised. A setting of five goose eggs was also received from which four goslings were hatched and two raised.

Care of the Chicks.—About twenty-four hours after hatching, the young chicks were placed in a coop with their mother and given bread and milk for two feeds. The first of these was given when the chicks were about one day old, followed by the second in perhaps four hours. For about a week following, they were fed entirely on prepared chick food. Then a wet mash consisting of shorts and milk was introduced into their diet and given them at noon. When about six weeks old they were allowed the same rations as the hens. There was always sour milk and green feed before them.

Subsequent Care.—The chickens were allowed to run for two and a half or three months. At this age the cockerels were picked out and confined in a pen for a week or ten days prior to selling as broilers. The poorer looking pullets were also classed with the broilers. The remaining pullets were marked with leg bands later in the summer in order that they might be distinguished from the old hens.

The percentage of sex was just about equal. There was practically no mortality.

The costs were distributed as follows:—

Housing, including runs, depreciation, interest and repair, 12.4 per cent; labour, 21.1 per cent; feed, 66.5 per cent.

Of the receipts, the eggs produced constituted 49 per cent of the total, and the surplus stock sold constituted 51 per cent of the total.

The following figures summarize the season's work.

THE AGRICULTURAL GAZETTE OF CANADA

POULTRY ACCOUNT, 1921-22

Receipts

Inventory January 1, 1922—

Buildings and yard.. . . .	\$67 00	
5 Roosters—4 at \$2.50—1 at \$1.50	11 50	
50 Hens.. . . .	75 00	
		\$153 50
Amount received for eggs, January 1 to June 1.. . . .	\$66 30	
Amount received for eggs, June 1 to September 1.. . . .	30 87	
Amount received for eggs, September 1 to January 1.. . . .	20 79	
May 27, amount received for broilers.. . . .	4 20	
June 3, amount received for old hens.. . . .	17 27	
July 17, amount received for broilers.. . . .	8 05	
August 20, amount received for broilers.. . . .	21 60	
September 4, amount received for broilers.. . . .	2 00	
September 15, amount received for broilers.. . . .	22 44	
September 19, amount received for broilers.. . . .	22 50	
September 19, amount received for old hens.. . . .	11 34	
December 20, amount received for geese.. . . .	7 50	
December 22, amount received for ducks.. . . .	6 00	
December 27, amount received for broilers.. . . .	1 50	
		\$242 36
		\$395 86

Expenditure

Inventory June 1, 1921—

Buildings and yard.. . . .	\$75 00	
2 Roosters.. . . .	10 00	
38 Hens.. . . .	76 00	
		\$161 00
Grains, from January 1 to June 1.. . . .	\$49 87	
Grains, from June 1 to September 1.. . . .	40 97	
Grains, from September 1 to January 1.. . . .	24 70	
Milk, from January 1 to June 1.. . . .	5 00	
Milk, from June 1 to September 1.. . . .	3 00	
Oyster shell	1 25	
New Cotton, 7 yards at 25 cents.. . . .	1 75	
Time 99 hours at 40 cents.. . . .	39 60	
10 per cent depreciation on equipment, yard and building.	7 50	
Interest on Buildings, etc., at 6 per cent.. . . .	4 50	
Interest on Average Inventory for year at 6 per cent..	9 43	
		\$187 57
		\$348 57
Net profit.. . . .		\$ 47 29

PROGRESS OF ELEMENTARY AGRICULTURAL EDUCATION IN SASKATCHEWAN

BY F. W. BATES, B.A., M.Sc., DIRECTOR SCHOOL AGRICULTURE

THE school exhibition is now an established institution in the province of Saskatchewan and further development will be along lines of better organization and more efficient correlation with the regular school routine, rather than in an increase of numbers. The Rural Education Association, having proven its worth, is adopting itself to the growing needs of the time. Boys' and Girls' Clubs are now recognized as worthy supplements to the

school and the whole problem of agricultural instruction is receiving sane and careful attention. The stage of experimentation and more or less vague effort has passed. The period of sifting the best from the work of previous years and adapting it to true educational ideals has been entered upon.

School exhibitions reached their present development and importance in the province in a comparatively short time. In 1909, one school exhibition, the first

THE AGRICULTURAL GAZETTE OF CANADA

of its kind, was held, and in 1921 the number of exhibitions had grown to 280. In that year 1,825 schools or well over one-third of the schools in the province, took part in exhibitions, and 42,100 pupils exhibited. The percentage of enrolled pupils exhibiting, given as 69.5 was also very high. The development of special contests in singing, public speaking and play has been noteworthy, and in many cases these have overshadowed the usual lines of school exhibits. The organization of the agricultural work under Boys' and Girls' Club rules is becoming more common, and is resulting in the elimination of many of the weaknesses of the past.

During the year 1921, 37 new rural education associations were formed, bringing the total number in the province up to 186.

The Boys' and Girls' Clubs were placed under the direction of the branch a year ago. Following up the system instituted in 1920, clubs continued to be organized as activities of Rural Education Associations, and in most cases are conducted under these auspices. There were, during 1921, 64 clubs with

247 branches, and a membership of 2,013 boys and 1,852 girls. The records show that more than twice as many centres took up club activities in 1921 as in the previous year, the number of branches increased in proportion, and there were almost four times as many members. The activities of the clubs consist of calf, pig, sheep, colt, and poultry rearing, potato growing, gardening, canning, stock judging and some other activities not specially provided for in the provincial club programme, such as manual training, sewing and baking.

Tree planting of school grounds is another matter coming under the supervision of the branch. Only in those districts where the ground is carefully prepared and the other regulations met, is this activity permitted. A total of 65 districts met the requirements in the spring of 1922 and were allotted a supply of seedling trees for planting. The plantations made in former years are on the whole doing well, and in a number of instances poor plantations are showing improvement.

RURAL SCIENCE SCHOOL, TRURO, N.S.

THE Director of Rural Science for Nova Scotia, Mr. L. A. DeWolfe, reports that the Rural Science Summer School for Teachers opened in Truro, N.S., July 12, with 203 in attendance. Of this number 33 are young men.

Many are attending for the first time, but several are enrolled for the third or fourth time. The usual enthusiasm prevails, and a great variety of activities keeps every one interested and occupied.

Besides the regular scientific and agricultural subjects, considerable atten-

tion is given to "extra-curricular" subjects. The Community Centre idea is well exemplified in the school recreation room. Public speaking, debating, athletics, playground methods, music, and basketry occupy the hours not devoted to scientific subjects. The daily programme is from 7 a.m. to 10 p.m. Having something to do every hour does more to create a good school spirit than any one might at first suspect. Working together and playing together fosters the community spirit, which the country so much needs.

HOUSEHOLD SCIENCE DEGREE COURSE, ONTARIO

THE University of Toronto announces the provision of a course in Household Science leading to the degree, Bachelor of Household Science. The course is designed primarily for persons actually engaged in teaching.

The first two years of the course are to be taken under the direction of the department of University Extension. This department provides classes in cer-

tain subjects at hours convenient for teachers and during the summer session in July and August. Students are required to have the ordinary teaching certificates and to qualify in all the subjects necessary for the first two years of the Arts course. The last two years must be taken in regular attendance at the University. Information regarding the course may be obtained on application to the Director of University Extension, University of Toronto.

PART IV

Special Contributions, Reports of Agricultural Organizations, Publications and Notes

VETERINARY SANITARY SCIENCE

A Brief Historical Sketch of the Early History of Live Stock Quarantine in Canada

BY DUNCAN McEACHRAN, LL.D., F.R.C.V.S., V.S., EDINBURGH, D.V.S. MCGILL, EMERITUS
DEAN AND PROFESSOR, FACULTY OF COMPARATIVE MEDICINE, MCGILL
UNIVERSITY, MONTREAL

HAVING been asked to present a short résumé of Veterinary Sanitary Science in Canada, it is necessary for me to revert to a time when the majority of those now most active in advancing the interests of the veterinary profession were either unborn or scarcely out of their swaddling clothes. To look back, the road appears very thorny, but, as youth looks forward with optimism, the good to be accomplished was ever ahead as a goal, the ideals were high, and in spite of the buffetings, it is now possible to look with satisfaction upon efficient systems which now protect this continent against the introduction of animal plagues from without, while they combat those within its confines.

As a young man just graduated from the celebrated school of veterinary science, the Edinburgh Veterinary College, upon request, I sought a new country for the practice of what art and science had been absorbed during the pursuit of the prescribed studies.

British America at the time of my arrival in 1862 was a new country divided into what were then known as Upper and Lower Canada. These distinctions, however, have in a large measure lost their significance. With the passing of time,

the great development of what were then known as the Northwest Territories has presented other problems. Within those territories five great provinces have been developed, and there is still a sufficient area for greater expansion in the future.

Approaching the shores of the continent in the fall of 1862, I beheld with anticipation what was to become my adopted country and in which I was destined to co-operate in pioneer work connected with veterinary education and sanitation. Shortly after my arrival I was associated with the late Professor Andrew Smith and assisted him in the commencement of the Ontario Veterinary College in Toronto, Ontario. At the suggestion of the late Mr. John Shedden, I removed to Montreal, where, through his influence and that of the Grand Trunk Railway, I soon developed a comfortable practice. This was in 1866. Through the kindness of the late Dr. George Campbell, Dean of the Medical College of McGill University, and the medical staff of that Faculty, and the late Mayor Campbell of St. Hilaire, President of the Board of Agriculture, the Montreal Veterinary College was established. A small grant of \$800 was voted by the Quebec Government, which when I built the Union

THE AGRICULTURAL GAZETTE OF CANADA

avenue structure was increased to \$1,800—leaving the balance of expenses to be paid out of my income from practice; but no financial assistance was given, and had it not been for the liberality of the teaching staff of the Medical College, it could not have succeeded. This school later became affiliated with McGill University as its Faculty of Comparative Medicine and Veterinary Science. The success of the efforts then put forth to raise the standards and standing of veterinarians is manifested, not by financial gain, but through the appreciation of my endeavours by the young men who have attended that institution, as evidenced by the remarkable dinner given by 63 of my former pupils, representing both Canada and the United States, many coming over 3,000 miles to take part in McGill University's great centennial gathering, but especially to do honour to the Faculty of Comparative Medicine, and the Dean in particular.

Education is the basis of all true progress; therefore, as a greater amount of knowledge became available, it was found possible and economical to prevent communicable diseases among animals. The epizootic of 1872—influenza in horses—created alarm, and its reappearance in 1875 caused a further feeling of unrest lest some more serious malady should present itself. This feeling of unrest was doubtless indirectly due to the greater appreciation by the laity in general of the fact that many epizootic diseases could be prevented; consequently, it was but natural that they should look for some relief. Transportation was becoming a simpler problem, and the avenues through which infection could spread were becoming more numerous as a result of improved mechanical devices on steamships, thus increasing the speed and safety attending the conveyance of live stock from one point to another.

About this time Foot-and-Mouth disease, Rinderpest, and contagious Pleuro-pneumonia, were common in

Europe and Australia, outbreaks of one or other causing much loss and serious disturbance in meat supply and, in many cases, ruin of the live stock breeders and owners. Knowing that it was only a matter of a short time till Canada would suffer in the same manner through imported live stock, a business rapidly assuming large proportions, I put myself in communication with three of the most prominent breeders and importers of pure bred cattle, sheep and swine—the late Hon. George Brown, Bow Park Farm, Senator M. H. Cochrane, Hillhurst Farm, Compton, and Senator David Christy, President, Board of Agriculture of Ontario. These gentlemen at once recognized the necessity for immediate steps being taken, and we met in Ottawa, and together interviewed the Minister and Deputy Minister of Agriculture. We were soon aware that neither appreciated the warning thus given. We then arranged for a meeting with the Premier, Hon. Alexander McKenzie, who on reading over a condensed statement of losses entailed by every country who took no precautions against the introduction of these ruinous plagues, said, "Gentlemen since I have been in politics this is the most important matter that has come before me for consideration." He immediately asked me if I would undertake for the Government to outline the necessary restrictions and, when considered and approved, would organize a system, suggest regulations, and assume the administration of necessary Orders-in-Council.

It was in 1875 that I was asked to outline what I considered the necessary restrictions to prevent the introduction into Canada of communicable diseases among animals. These are included in the following letter addressed by me to the Minister of Agriculture:—

"Montreal, 28th Sept., 1875.

"SIR,—

"The consideration of contagious and infectious diseases with a view to preventing their introduction into this country is a subject to which my attention

has long been directed as I had considerable experience with them in Britain before coming to this country. During my recent visit to Europe, I visited several farms to familiarize myself with Foot-and-Mouth disease, and from numerous conferences, with professional men on the subject I gathered what practical information I could relative to and the best means of dealing with them.

"By the careful study of the works of Flemming, Gamgee and others, I hope I have prepared myself to be of some service to the Department in taking the proper measures in endeavouring to preserve our valuable herds and farm stock free from contagious disease of a preventable character.

"It is a well established fact, that Cattle Plague, Pleuro-pneumonia, Foot-and-Mouth disease, Smallpox in Sheep, were all introduced into Great Britain by stock imported from infected districts on the continent of Europe, that they spread entirely in the lines of commercial communication, and that they are propagated by contagion and by contagion alone.

"For want of proper preventive measures these diseases have from time to time been introduced and spread over the British Isles bringing death, or almost equally ruinous deterioration in value of the entire stock, as for the time being to paralyze the agricultural industries of the country, create dearth and destitution among the labouring classes.

"The annual loss to the mother country is counted by millions of pounds sterling.

"Our country is essentially agricultural, the livestock interests represent a very large proportion of our wealth. So far we have enjoyed almost perfect immunity from such diseases. This fact alone has directed the attention of other countries to Canada as a rich source of meat supply, and this industry properly preserved and judiciously encouraged will doubtless soon become a rich source of revenue.

"That active steps are necessary need not be doubted when we know for a fact that, owing to the unusual prevalence of such diseases in England, it is almost impossible for animals to be shipped from an uninfected district; and that it is quite possible that an animal on being shipped will present no symptoms by which the disease could be recognized. The stage of incubation (period elapsing from the introduction of the disease germ till the development of symptoms)

in Foot-and-Mouth disease varies from twenty-four hours to 12 days; Cattle Plague, usually 5 to 6 days, but by many it is said to extend to 16 or 18 days; Pleuro-pneumonia from 30 days to 10 or 16 weeks; and further that it is a fact that hay, straw, blankets, halters, clothing of attendants, etc., may be the medium of conveying and propagating the contagion—except in the case of Contagious Pleuro-pneumonia—the presence of which in these articles no inspection or examination can determine till the effects declare the fact.

"That the effect of a visitation of the least virulent of the above diseases to a herd by death, loss of flesh and injury to constitution, cessation of the secretion of milk, abortion, want of conception, etc., reduces its value from forty to sixty per cent.

"That these diseases with proper precautions are preventable, I have every reason to believe. The length of time elapsing from the time of shipment to their landing in the country, with the tendency for seasickness to hasten the incubation stage, are all favourable to an early development of the symptoms and recognition of the disease after landing, and thereby enable us to shorten the duration of quarantine. Our cold clear climate during winter and our dry atmosphere during summer, in my opinion, would make such diseases more controllable than in the humid heavy atmosphere of Britain. But on the other hand we know from our experience of epizootics among horses, that once the disease is propagated these very circumstances favour their spreading in a most extraordinary degree.

"I have taken the views of our most extensive importers and find that a system of quarantine would meet the approval of all of them.

"Should the Department desire it, I shall be happy to lay before them, either by letter or interview, some suggestions as to how this could be carried out without disturbing the cattle trade of the country, but on the other hand securing it by preserving a clean bill of health to our valuable herds, believing as I do with Professor Gamgee, *'that it is of the highest importance to protect the property of our people, to prevent our improvident waste of life and money, and submit a choice of evils to some interference with the freedom of the subject wherever the doings of one man or a few are likely to injure the million'*—an interference which would be approved of most by those whom it would most affect.

"Doubtless the carrying out of a thorough system of inspection, quarantine and disinfection, would occupy time and cost money but the advantages to the country would be very great.

"The above is respectfully submitted by

Your obedient servant,
(Sgd.) D. McEACHRAN.

"To the Honourable the
Minister of Agriculture,
Ottawa."

In looking over the memorandum then prepared, I cannot observe that it could have been greatly improved in the light of the knowledge then available. The outline was favourably considered, although certain difficulties beset the path and rendered its immediate adoption impracticable as instanced by the following communication received from the Department of Agriculture:

"DEPARTMENT OF AGRICULTURE,
"Ottawa, 1st October, 1875.

"SIR,—

"I am directed to acknowledge with thanks, the receipt of your communication of the 28th ultimo and to reply thereto.

"The importance of your communication is as great as are the difficulties of dealing with so embarrassing a subject. There is perhaps danger in not adopting some measure against the eventual introduction of the epizootics spoken of in your letter, and there is a danger of another kind in the creation of alarm both in this country and abroad, by the adoption of public and stringent measures in the mere provision of the possible introduction of these diseases. It has been thought advisable to take a middle course between establishing a strictly legal quarantine, and adopting no measures at all.

"I am, therefore, instructed to ask you, if you would be willing to accept a confidential mission, which would have to be executed as secretly as possible in order not to create alarm in our internal and foreign commercial relations. This mission would consist in quietly proceeding to Quebec to see, with the private and voluntary permission of the owners of vessels, the imported stock that might be on board such vessels, on their arrival at that port, and in case of no disease, to say nothing to anyone; but in

case of contagious disease being in existence among such cattle, then to impress on the owner thereof, or his representative there present, the necessity of keeping for some time apart such animals under proper measures of separation and treatment under your immediate direction; the whole without cost to the owner, you defraying the necessary and legitimate expenditure on behalf of the Government.

"This mission is essentially a mission of persuasion and amicable arrangement between you, the shipowners and proprietors of cattle, for the simple reason that in the absence of an Order-in-Council and Proclamation, you cannot be invested with stringent authority. It is to avoid the publicity exacted by the Act 32, 33 Vic. cap. 37, relating to contagious diseases of animals that the present course is thought the most advisable.

"Be kind enough to answer me by return of mail mentioning your acceptance and conditions, in order that no delay intervene in the adoption of the above mentioned measures."

"I have the honour to be, sir,
Your obedient servant,
(Sgd.) J. C. TACHE,
Deputy Minister of Agriculture.

"Dr. D. McEACHRAN,
Veterinary College,
Montreal."

That the task then allotted me was as delicate as it was confidential is instanced by the foregoing letter. The difficulties to be encountered by the adoption of such a radical policy were not then wholly unforeseen, however, in spite of the arduousness of the undertaking, and the following letter presents the hearty co-operation then afforded for the conduct of the allotted investigations and the satisfactory circumstances under which they were to be inaugurated.

"DEPARTMENT OF AGRICULTURE"
"Ottawa, 5th October, 1875.

"SIR,—

"In answer to your letter of yesterday's date, accepting the confidential mission proposed to you in my last communication, I am directed to authorize you to act on the strength of the instructions thus in advance conveyed to you, and to authorize you, moreover, to employ an assistant in Quebec under your direction and responsibility

"It would be for yourself to make any arrangement necessary with the Telegraph Company, and the shipowners in the way mentioned in your letter.

"As it is impossible before hand to forsee the extent of the duties to be performed, and the amount of expenses necessitated, the Department will rely on your discretion for the settlement of all reasonable accounts.

"You may, therefore, at once enter upon the accomplishment of your mission, and be kind enough to report from time to time about the result and expenditure."

"I have the honour to be, sir,
Your obedient servant,
(Sgd.) J. C. TACHE,
Deputy Minister of Agriculture.

"D. McEACHRAN, Esq.,
Veterinary College,
Montreal."

After the assumption of the mission as laid down, it was soon evident that further and more definite action should be taken. In the first place, from an examination of *The Contagious Disease Animals Act*, it was found to be written at a time when it was thought distance from countries in which these diseases existed was sufficient protection, and quite inoperative for the enormously increased steam communication with Britain especially, and the rapidly growing importation of live stock. I was asked to revise it, and this I did, and assisted by the Law Department at Ottawa, it was prepared, submitted to Parliament and became law. Orders in Council based on this Act were passed from time to time as necessity arose, and the regulations were rigidly enforced.

Of course, as is usual when new legislation is passed to meet new conditions, there was a good deal of faultfinding by interested parties, which, however, gradually subsided as the meaning of and necessity for the regulations were understood. In this the press helped us greatly. One of the first orders was one prohibiting the importation of cattle from England on account of the existence of Foot-and-Mouth disease. A

newspaper comment on this action was expressed as follows:—

"Despite the stringent terms of this prohibition Mr. Whitfield, a rich West Indian Merchant, who has an extensive farm at Rougemont, Province of Quebec, undertook to import some thirty pure bred cattle from Liverpool, trusting to the plea of improving Canadian livestock to have an exception made in his favour. To the credit of the country the prohibition was maintained, and Mr. Whitfield had to remove his cattle to Newfoundland, whence they were subsequently re-shipped to England and sold at an enormous loss."

This drew the attention of the authorities at Ottawa to a sense of their duty in this connection, and upon my advice the first quarantine station for animals on this continent was established in 1876 opposite the City of Quebec in the premises of Fort No. 3 at Levis. This animal quarantine station is almost ideal in its location and surroundings. Through it have passed many of the best animals from which the flocks and herds of North America have sprung, and importers have given a preference to the St. Lawrence route on account of the general improvement noted in stock that have undergone their period of detention at this point. Good as was our first station, the present one provides all the requisite quarantine facilities, insuring safety in approach, perfect isolation, residence for caretaker, plenty of land for the sheds and yards, and also a special landing station for receiving and despatching the animals. After the inception of the work as above recorded, little of an interesting nature transpired, save the routine connected with the organization of any new work, till 1879, when Pleuro-pneumonia appeared in the Eastern States. As a result of the existence of this disease among a cargo of cattle arriving on the steamer *Ontario* at Liverpool, an Order-in-Council was passed, January 29, 1879, prohibiting the importation or transit of animals originating within the United States, into or through Canada. The

favourable comment on this action by the Liverpool Daily Courier of January 30, 1879 (3), was as follows:—

“The Canadian Government seem to have acted in this case with great promptitude and decision, not for injury to the United States trade, but for the protection of their own interests. The information that pleuro-pneumonia had been detected in the Ontario's cargo, and the animals condemned by the Privy Council's inspectors, was known in Liverpool Tuesday evening, and was telegraphed to Ottawa at half-past six o'clock. Allowing for difference of time, the message would reach Ottawa about two o'clock in the afternoon; and the Hon. J. H. Pope, Minister of Agriculture, must have been on duty at the office at the time. He at once summoned a Cabinet Council, and within an hour or two an Order in Council was issued prohibiting the entry of cattle from the United States into the country absolutely. This is simply carrying into execution the established policy of the Canadian Government of protecting their own herds by imposing stringent regulations against the importation of cattle from countries under the taint of suspicion.”

To verify the existence of the disease, I visited Maryland, the District of Columbia (assisted by Dr. Bushman), and the city of Brooklyn, N.Y., being accompanied by Drs. Gadsen and Lockhart. Professor Liautard assisted materially in the investigations then made as did also Dr. L. McLean the then veterinary inspector to the Board of Health for Brooklyn. In reading again some of the notes and newspaper clippings of that time—1879—my mind reverts to the disgusting conditions then found, which modern sanitation and adequate sanitary inspection now render impossible.

Professor Law was at this time authorized by Governor Robinson of New York State to stamp out the disease by the killing of the cattle if this was found necessary. A prominent agriculturist in the person of General Patrick of Onandaga was delegated to assist him in this work. To the credit of both, the work was well handled in spite of the many obstacles which were confronted.

That the possibility of pleuro-pneumonia appearing in the United States was not wholly overlooked is attested by the fact that the Federal Government in 1871 published an excellent work on the disease prepared for them by Professor John Gamgee. No previous effort had been made, however, to prepare for such an emergency as existed in 1879. Public opinion did not with unanimity accept the statement that the disease was pleuro-pneumonia, instancing that the same affection had been common to distillery fed dairy cattle since 1842, nevertheless the professional views were incontrovertible and prevailed, and the impetus given to the general improvement of the conditions under which animals were kept especially dairy cattle, was great. Steps were soon taken for the further safeguarding of the livestock by the various authorities concerned, and as we look back it seems more than probable that this outbreak of pleuro-pneumonia was a blessing in disguise, for it opened the way to a fuller conception of the ability of veterinary surgeons to act as sanitarians.

As early as 1880 Canada prohibited the introduction of hogs from the United States on account of the prevalence of hog cholera. This was prior to the existence of any exact knowledge concerning the cause of the disease, and what was known concerning it had been secured through the school of experience and close observation. This order was shortly modified and hogs were allowed entry when they were destined for immediate slaughter.

In August, 1882, six years after the inception of the Quarantine Station at Quebec, it was visited by the American Treasury Cattle Commission which consisted of Professor James Law of Cornell University, Dr. E. F. Thayer, of Boston, and Mr. J. H. Saunders, Editor of *The Breeder's Gazette*, Chicago. Their mission was one of inspection, as it was then considered probable that cattle quarantine stations would be established

at the ports of Boston, New York, Baltimore, and Philadelphia. Their report on the quarantine station was very complimentary.

In 1882, Texas fever threatened to invade Canada, but fortunately it did not gain access. At that time the nature of the malady was not understood, and, therefore, any measures adopted to restrict its ravages were more drastic than are considered necessary at this time when, thanks to the painstaking researches of Professor Theobald Smith, of Harvard University, and Dr. Kilborne, we are familiar with the parasite and its transmission by the cattle tick.

In February, 1884, Foot-and-Mouth disease was introduced at Portland, Maine, in cattle brought by the steamship *Ontario*. I was sent for by the Live Stock Commissioners of Maine, at the request of the owner of the cattle, and assisted the state veterinarian, Dr. Bailie, in establishing quarantine, which was removed within three months. Several hundred cases occurred, but the disease did not spread in Portland or surrounding country, thanks to the strictly administered quarantine measures.

In 1886, pleuro-pneumonia was introduced at the Quebec Quarantine Station, and it may here be mentioned that Foot-and-Mouth disease has been introduced at this station on several occasions, but, by the barrier which the station interposed, the spread of the infection outside of the restricted area has always been prevented.

During the period to which I have referred, I was not unmindful of the desirability and necessity of having a properly equipped experiment station at which evidence could be secured relative to the best means of dealing with the problems confronting us. In 1892, through the estimate and report of the late Dr. Wyatt Johnson, a new impetus was given to the project, but the requests then made were unavailing and it was not until 1898, when, with the co-operation of Drs. Adami and Martin, a

small station was established on my own property at Outremont, the expenses of which were paid by the Department of Agriculture of which the late Hon. Sidney Fisher was Minister. In this connection I cannot commend too highly the hearty co-operation accorded us by the Washington authorities when problems of vital interest to the United States and Canada were involved—a friendly reciprocity, much to the benefit of both countries, which continued as long as the administration of quarantine affairs was under my direction. On more than one occasion, such as when we agreed that direct inoculation by Rutherford of Edinburgh as a preventative of contagious pleuro-pneumonia was a serious danger to both Canada and United States, which must be stopped, or importation from Britain arrested, I was commissioned to represent both countries in the matter, and succeeded in the protection from a serious menace of all three countries. England passed an order making this practice illegal under severe penalties.

The importance of the science of sanitation will continue to increase, and the basis of this importance will, in the future as in the past, rest primarily upon the educational standards of the veterinary colleges and the integrity of the men who are called upon to deal with the problems involved.

Mr. Alexander Waddell was appointed in 1876 to take charge at Quebec on the opening of the Point Lévis Cattle Quarantine. Mr. Waddell performed the duties of local inspector and manager till his death in 1879, with much satisfaction to the Department and me as Chief Inspector. He was an old Scottish graduate of the Edinburgh Veterinary College, advanced in years and experience, a man of high principles, faithful and just, whose services as a veterinary practitioner in Quebec city were universally appreciated.

Mr. Waddell was succeeded in this position by Dr. J. A. Couture, a graduate

of the Montreal Veterinary College, and for many years a valued examiner of graduates. He published a valuable monograph of the Guion system of judging dairy cattle by the escutcheon. He was appointed Local Inspector and Superintendent of the Point Lévis Cattle Quarantine in 1879, and filled the position faithfully and satisfactorily till his lamented death, which occurred on March 12, 1922, after a somewhat prolonged illness.

He prepared himself by careful study of contagious diseases, and was efficient in the diagnosis and sanitary measures necessary to the effective carrying out of his duties. He at the same time did much good service in connection with the Department of Agriculture, and Horse and Cattle Breed associations in the Province of Quebec. He was an industrious worker, and was ever ready to give his assistance to any efforts tending to better the live stock interests of the Province or Dominion. He was largely instrumental in reorganization of the Cattle Quarantine Station in its present position, which is creditable alike to him and the Government. It is without doubt the most complete station of the kind to be found anywhere. His name should be in some way perpetuated in connection with the Point Lévis Cattle Quarantine.

Another officer was Mr. Wm. Welch, whose long service as foreman and manager of the Lévis Quarantine was characterized by efficiency and faithfulness. He was approved by the Department and me most highly, and the owners of cattle, both Canadian and American, were always loud in praise of his trustworthiness and obliging disposition. His long service began in 1879 and he held the position for 43 years, being superannuated in May, 1922.

I apologize for the length of this historical sketch, yet I feel that it

would be incomplete were I to close without a few remarks on others who helped to build up the Cattle Quarantine system of Canada to its present high state of efficiency. Following Hon. Alexander Mackenzie in appreciating the importance of this branch of the Department of Agriculture, came Sir John A. Macdonald, who realized as much as I did the value to the country at that time of the successful prevention of introduction of contagious bovine diseases, raging in Great Britain, and more than once did he freely express his conviction that had delay or less thoroughness in administering of the preventive measures been followed that particular time, the loss to the country in live stock might have cost millions and set the progress of agriculture back at least fifty years, or double that.

Once established and the whole matter evolved in its relation to agriculture, subsequent governments realized its paramount importance and to-day no other Dominion, and few countries, have such thoroughly equipped Live Stock and Meat Inspection organizations. Much credit is due to my successor, Dr. J. G. Rutherford, and the present incumbent, Fred Torrance, B.A., D.V.S., one of my students and graduates, possessed of scientific knowledge and commendable executive ability, and a personality appreciated by all serving under him or doing business with his branch of government service.

References

- (1) *New York Herald*, 1872.
 - (2) *Canadian Sportsman*, September 1, 1882.
 - (3) *Daily Courier*, Liverpool, January 30, 1879.
- Montreal Gazette*, February 12, 1879
—Editorial.

A METHOD OF JUDGING FOWLS FOR EGG PRODUCTION

The method of judging egg production, formulated at the Judging School held at Cornell University, Ithaca, N.Y., July 1-6, 1918, and approved by the American Association of Instructors and Investigators in Poultry Husbandry, as revised July 3-8, 1922, by Representatives of Poultry Departments, Connecticut, Indiana, Massachusetts, New Jersey, New York, Ontario, Canada, Oregon, Wisconsin, participating is given below.

In order to lay well a bird must have a sound body. As a first consideration a bird must be vigorous and healthy. Vigour and Health are shown by a bright, clear eye, a well set body, a comparatively active disposition and a good circulation.

Further, the bird must be free from Physical Defects, such as crooked beak, excessively long toe nails, eyelids that overhang so that the bird cannot see well, scaly leg or anything else that would keep the bird from seeing or getting an abundance of food.

Age, condition, feed and range should be considered in culling a flock.

Type.—The type of a bird indicates the degree of intensity with which it can lay. Type can be applied to any breed, age or sex, or condition at any time of year.

In order to make a record a hen must not only lay long, but heavily. In order to lay heavily, she must have sufficient body capacity to digest large amounts of food rapidly. Large capacity in a laying hen is shown by a body that is relatively deep. The under line should be fairly straight and the back should be comparatively horizontal.

The back should be flat and wide and its width should be carried well back to the tail. The back that tapers decidedly or slopes down indicates poor capacity.

The breast should be full, deep and prominent. The neck should be fairly short and well set. The legs should be

of moderate length. The long-legged, round-shanked, long-necked, bony or crow-headed individual is not a good layer.

The keel bone should be long and generally curved. This frequently means that the abdomen of a good male will be small rather than large.

The head should be moderately fine with large, bold eyes set well out on the side of the head in an oval eye socket. The head should be wide and flat at the top, and wider on top than below the jaws. A fat-headed, small, round-eyed, or cross-eyed bird or one with overhanging eyebrows, or having a comb with extremely narrow serrations is not likely to be a good layer.

Long, narrow feathers indicate a late maturing bird. Care should be taken not to confuse a bird that appears deep because of long, loose feathering, with one that has an actual bone and flesh depth.

Depth, and slabsidedness may be measured by placing the thumbs on the middle of the back, the little fingers on the front end of the keel bone and the middle fingers on the rear end of the keel bone. Press in with the palms of the hands and do not squeeze the bird up with the fingers. The deeper and more slabsided the bird feels, the better. It is relative depth that is desired and not actual depth. A big hen may be actually deep and yet relatively shallow and hence be a poor layer. Relative depth of front to rear of body may be measured by spanning the body with the thumb and middle fingers from back to breast and sliding the fingers and thumb along the keel and back.

Body changes Due to Laying.—A laying hen has a large moist vent, showing a wide, dilated condition and looseness as compared with the hard, round, puckered vent of a hen that is not laying.

The whole abdomen as well as the vent is dilated so that the pelvic arch is

widespread and the keel is forced down, away from the pelvic arch. The more eggs a bird is going to lay the following week the greater will be the size of the abdomen. The actual size of the abdomen is influenced by the length of keel, size of eggs laid and by the size of the bird. A sagging abdomen is undesirable.

Heavy production is shown by the quality of the skin and the thickness and stiffness of the pelvic bones. Fat goes out from the skin and body with production so that the heavy producers have a soft, velvety skin that is not underlain by layers of hard fat. The abdomen in particular is soft and pliable. The sternal processes are very prominent and are generally bent outward. The thicker and blunter the pelvic bones and the greater the amount of hard fat in the abdomen, the less the production or the longer the time since production.

Changes in Secondary Sexual Character.—The comb, wattles and earlobes enlarge or contract, depending on the ovary. If the comb, wattles and earlobes are large, full, plump and smooth, or hard and waxy, the bird is laying heavily. If the comb is limp the bird is only laying slightly, but is not laying at all when the comb is dried down, especially at molting time. If the comb is warm it is an indication that the bird is coming into production.

Loss of Fat Due to Laying.—Colour, or pigmentation changes. (These should be observed by daylight.)

A laying fowl uses up the surplus fat in the body, especially it removes the fat from the skin. In yellow skinned breeds, this loss of fat and pigment can readily be seen by the loss of the yellow colour. The different parts of the body tend to become white, according to the amount of fat stored in the body and the amount of circulation of blood through those parts. The changes occur in the following order:

The Vent changes very quickly with egg production so that white or pink vent on a yellow skinned bird generally means that the bird is laying, while a yellow vent means the bird is not laying. It should be recognized that all yellow colour changes are dependent on the feed, coarseness of the skin and size of bird. A heavy bird fed on an abundance of green feed or other material that will colour the fat deep yellow will not bleach out nearly as quickly as a smaller or paler coloured bird. A bird with lustrous shanks does not fade as quickly as a dull shanked bird.

The Eying, that is, the inner edges of the eyelids, bleaches out a trifle slower than the vent. The ear lobes on leg-horns and anconas bleach out a little slower than the eyering, so that a bleached earlobe means a little longer or greater production than a bleached vent or eyelid.

The colour goes out of the beak beginning at the base and gradually disappears until it finally leaves the front part of the upper beak. The lower beak bleaches faster than the upper, but may be used where the upper is obscured by horn or black. On the average coloured yellow-skinned bird, a bleached beak, means heavy production at least for the past four to six weeks.

Molting.—When a bird stops laying in the summer she usually starts molting. The later a hen lays in the summer or longer the period over which she lays, the greater will be her production, so that the high producer is the late layer and hence the later molter. The length of time that a hen has been molting or has stopped laying can be determined by the molting of the primary feathers. It takes about four to six weeks to completely renew the primary feathers next to the axial feathers and an additional one to two weeks for each subsequent primary to be renewed, depending on the type of the feather; very long or very wide feathers grow slowly.

THE AGRICULTURAL GAZETTE OF CANADA

Temperament and Activity.—A good layer is active, intelligent and friendly and more easily handled than a poor

layer. A low producer is shy and flighty and stays on the edge of the flock and will squak when caught.

NEWS ITEMS AND NOTES

Mr. W. A. Dryden, Brooklin, Ontario, the well-known breeder of Shorthorn cattle, is visiting South America as the representative of the Dominion Department of Agriculture for the purpose of studying the market for Canadian breeding stock. While there, he will attend the Buenos Aires Live Stock Exposition with a view to ascertaining requirements, and will seek to interest importers in Canadian-bred foundation stock.

The number of dairy herds in Canada which have been fully accredited by the Veterinary Director General is now over 200. In addition to these 876 herds are in process of accreditation.

According to a statement issued by the Veterinary Director General, it has been decided, in connection with the accreditation of pure bred herds, to make ten the minimum number of animals in a herd eligible for test. Hitherto the number has been twelve. The change is warranted by the large number of applications, and to the satisfactory progress being made with the work. The Department is now prepared to receive applications from owners of herds containing a minimum of ten pure bred animals including a pure bred sire.

The Biological Laboratory of the Health of Animals Branch located hitherto at the Central Experimental Farm has been assigned new quarters on Cliff Street, Ottawa.

In Prince Edward Island a variety of barley has been produced that drops nearly all of its awns before harvesting. This variety, which is known as Charlottetown No. 80, originated at the Charlottetown Experimental Station and was obtained by selection from a locally grown barley known as Old Island Two-row. In comparison with other sorts it is a good producer, averaging about eight bushels more per acre than the average of the eight next best sorts tested at the Station during the past nine years. According to Mr. J. A. Clark, the Superintendent, this barley has practically replaced all other sorts in that province.

The report of the Dominion Apiarist supplies much interesting information relative to the prevention of swarming and regarding breeding experiments. Considerable work is being done at Ottawa in the rearing of queens. Last year 289 queens of select parentage were reared there, of which 125 were sent to private beekeepers, 69 to Duck Island for isolated mating, 51 were mated at Ottawa and introduced to the Central farm colonies, and 20 were mated at Ottawa and sent to branch farms. Much loss has been experienced of queens in transportation, but methods are being tried out by which it is hoped that this will be overcome.

During the last few years experiments have been carried on to determine which districts of Canada are suitable for flax fibre culture. These experiments have shown that the fibre obtained from flax grown on the Experimental Farms in the western part of British Columbia, in Ontario, the valley of the St. Lawrence, and the Maritime Provinces, is first class in quality, comparing favorably with the best grades of Irish or Belgian fibre. Especially gratifying is the fact that spinning tests have proved that from Canadian fibre can be manufactured the finest linen damasks.

Last year the Dominion Cerealists did considerable work with a view to ascertaining the best method of control of smut in oats, confining his experiments mainly to the Liberty variety which being hullless, cannot be treated with formalin. The work was conducted in co-operation with the Division of Botany of the Dominion Experimental Farms, which division is now continuing the investigation.

The Division of Economic Fibre Production of the Experimental Farms Branch makes careful test of newly invented pulling, deseeding or scutching machines, and furnishes information regarding their effectiveness. Tests of varieties, fertilizers, commercial scutching, binder twine making, retting, and the recovery of flax tow are conducted. A system of grading has been adopted, and the examination and grading of

THE AGRICULTURAL GAZETTE OF CANADA

seed for export is undertaken. Another important arrangement is the despatching to flax growers, spinners, and any one interested in the production of flax for fibre, of the contents of cablegrams outlining conditions and prices prevailing in Europe received from the Irish Department of Agriculture.

Dominion Live Stock Commissioner states that Canada today has more nondescript hogs than she had ten years ago, and that the general lack of high quality is apparent in almost every province. In substantiation of this statement an estimate is made of the hogs that would probably grade as "Select" for bacon purposes. In Ontario and Prince Edward Island the figures are from 35 to 40 per cent; in Manitoba, from 30 to 35 per cent; in Quebec, from 20 to 25 per cent; in Saskatchewan, from 15 to 20 per cent, and in Alberta, from 10 to 15 per cent. This indicates pretty clearly the extent to which hogs are being bred to the bacon type in the several provinces.

The Dominion Live Stock Branch has received the following report from Slough, England, of the sale of 82 head Holstein-Friesian cattle, imported from South Africa. Mention of this sale was made in cable dispatches. The prices paid were remarkably high, the astonishing average of \$5,651.39 and total of \$469,090 being realized.

The top price was made by a fourteen month heifer Melrose Dilianna for which \$20,554 was paid. Harlons Marthus a twelve month bull headed the males at \$18,642. The lowest price was \$764.80 paid on a four day old calf. The twenty-eight bulls averaged \$6,296 a total of \$176,289.75 and the fifty-five cows and calves \$5,323.65 a total of \$292,800.75.

Jas. Telfer, District Sheep Promoter for Western Ontario, who has been actively engaged in dipping demonstration work for the past two years, has been most successful in the installation of community dipping tanks. Farmers co-operate in hauling the material, buying cement and providing the labour. The actual cost of tanks erected in this way, not counting labour, is six dollars. Forms are supplied, and the material required is one and a half yards sharp gravel, five bags of cement, and a few field stones.

The Bureau of Animal Industry of the United States Department of Agriculture has found that vitamins exist in the muscle fibre of beef, veal, mutton, lamb, and pork.

A booklet on Bird Protection, consisting of three lessons viz.: "The Value of Birds to Man," "How Birds are Protected" and

"How Children can Assist," has been published by the Dominion Parks Branch of the Department of the Interior, Ottawa. These lessons are authorized for use in the schools of Canada and a copy is being mailed to every school.

The scouting work to determine the spread of the European Corn Borer during this season in southern Ontario began on July 24 with five crews engaged. The Province of Ontario will co-operate in carrying on this work as was done during the past two years.

Scouting work for the Alfalfa Weevil was started in Southern Alberta on July 1. Owing to the large amount of alfalfa being grown in this area, it was decided to determine whether this pest had invaded the alfalfa growing districts. The work is under the immediate supervision of Mr. H. L. Seamans of the Lethbridge Laboratory.

The scouting to determine the spread of the Apple Sucker in Nova Scotia was completed some little time ago. It was found that the pest had spread into quite a large area, particularly in a southerly and south-westerly direction. The work was carried on in co-operation with the Nova Scotia Department of Agriculture.

The importance of milk in the diet of both young and old is constantly being emphasized by the medical profession. Mal-nutrition or undernourishment, it should be understood, is not always the result of insufficient food, but frequently of unwisely and improperly chosen foods. This is supported by the fact that investigation has shown that a large percentage of under-nourished children are the offspring of well-to-do parents. The thoughtful mother will see that her children get plenty of milk from which to build a strong framework, develop mental capacity, and good health. Future happiness depends largely on these factors.

Each summer season the Dominion Department of Agriculture through the Dairy and Cold Storage Branch arranges with the railways in Canada for the operation of iced refrigerator cars for cheese shipments, the Department paying the cost of the icing up to eight dollars per car per week. Under this arrangement, the railway managements, upon proper application from shippers, furnish cars properly iced for the transportation of cheese in car loads, the minimum being 16,000 lbs., to Montreal for local delivery or for export. The arrangement also applies to less than car-load quantities shipped by one or more consignors from one station, when the aggregate weight is not less than the

minimum. That is, shippers can combine to make up a load. The agreement this year runs from June 5 to September 2.

One of the most progressive districts in Canada is that of Lake St. John, Quebec, reports the Dominion Dairy and Cold Storage branch. The people in the district depend largely on dairying and hog raising. Their farms are well and neatly kept, some wired and lighted by electricity, the barns having cement floors, iron stanchions, individual water bowls, and litter carriers. Last year 49 herds comprising 616 cows were tested around Metabetchouan and had an average of 5,207 lb. of milk and 205.7 lb. of fat. In the spring of this year the provincial dairy inspectors had organized testing centres comprising 637 herds and 8,847 cows. Cheese from this district is highly thought of in Montreal. The district is also noted for its scenery and its hunting and fishing.

All cheese making in Canada was carried on as a farm industry until 1864, when the first factory came into existence in Oxford county, Ontario. In the following year a factory was established in Missisquoi county, Quebec. The progress of factory establishment was so rapid that in a few years the system was generally adopted, and farm-made cheese became a rarity. While every one of the nine provinces has its cheese factories, about 97 per cent of the production has to be credited to Ontario and Quebec. Incidentally it might be mentioned that the total value of the cheese made in this country runs up to between thirty-five and forty million dollars per annum, and the quantity totals up to around a hundred and fifty million pounds, sometimes over and sometimes under. The variation in production is considerable, as will be understood when it is stated that in 1914 it was 169,478,340 lbs. and in 1920 nearly twenty million pounds less.

In Canadian factories the manufacture of cheese is mostly confined to what is known as Cheddar, but genuine Stilton is turned out on the Dominion Experimental Farm at Agassiz, B.C., and the Trappist monks at the Oka Agricultural Institute in Quebec make what is known as Oka cheese. Another form of cheese made in this country is Cottage cheese, which is made in many households from sour skim-milk without the aid of rennet. For cream cheese there is also a demand of some dimension.

The total quantity of dairy butter produced in 1921 in Canada was 122,776,580 pounds valued at \$45,893,082. This is an increase in quantity over the previous year of 11,084,862 pounds. Increased production is shown by all the Provinces with the exception

of Prince Edward Island, the largest proportionate increase, 36 per cent, being recorded by British Columbia. In order of dairying importance the Provinces rank: Ontario, Quebec, Alberta, Manitoba, Saskatchewan, Nova Scotia, British Columbia, New Brunswick, and Prince Edward Island.

In the first five months of the year 1920 Canada exported to Great Britain 24,477 long hundredweight of butter and 197,916 hundredweight of cheese. In the first five months of the present year we exported to the United Kingdom 170 hundredweight of butter and 94,248 hundredweight of cheese. The figures are enlightening but hardly flattering, especially in view of the fact that the exportations from Australia quadrupled, from New Zealand tripled, from Argentina were increased five-fold, and from Denmark, as regards butter, doubled. All the other exporting countries, including the United States, show a decrease. There is considerable hopefulness to be derived, however, from the fact that the butter imported into Britain from this country in the year 1913 amounted to only 813 hundredweight compared with 43,138 hundredweight in 1921, which makes it apparent, taking the figures previously quoted into account, that the early months of the year are not Canada's best for the exportation of butter across the seas. Great Britain last year imported 3,523,998 hundredweight of butter and as a shortage of the commodity is reported there, it would seem that Canada has an opportunity by supplying the English market to offset any loss of trade caused by the new tariff of the United States.

The Dairy News Letter, circulated by the Dairy and Cold Storage Branch, gives a satisfactory report of the advance of cow testing. In 1915, Alberta, British Columbia, and Manitoba were not included in the records and the average per cow tested was 5,285 lbs. milk and 195.5 lbs. fat. In 1919 the whole nine provinces, were included and the average was 5,522 lbs. milk, 207.9 lbs. fat. In 1921 the average, also for the nine provinces, was 5,801 lbs. milk and 214.1 lbs. fat. Manitoba stood at the head in milk production last year with an average of 7,317 lbs. milk and 228.9 lbs. fat, but British Columbia ranked first in fat with 6,392 lbs. milk and 276.5 lbs. fat. The other provinces—all of which showed an increase in averages excepting New Brunswick and Prince Edward Island, the latter's decrease being so slight as to be hardly worth mentioning—stood last year as follows: Ontario 7,136 lbs. milk, 245.8 lbs. fat; Prince Edward Island 6,569 lbs. milk, 242.1 lbs. fat; Alberta 7,048 lbs. milk, 229.6 lbs. fat; Saskatchewan, 6,861 lbs. milk,

227.8 lbs. fat; Nova Scotia, 5,283 lbs. milk, 216.8 lbs. fat; New Brunswick, 5,024 lbs. milk, 200.4 lbs. fat, and Quebec 4,946 lbs. milk, 192.3 lbs. fat. These averages show an advance resulting from the adoption of the system of testing, but the averages would be higher except for the cows that each year are tested for the first time. A number of herds show an average production of over 10,000 lbs. milk and 350 lbs. fat, while some of the herds average less than 4,500 lbs. milk and 150 lbs. fat, but both high and low show improved production under the method. In May, 1922, there were 1,318 herds and 11,922 cows recorded, compared with 1,264 herds and 11,456 cows in the same month last year.

Last year the production of apples in Nova Scotia amounted to 2,036,065 barrels, in New Brunswick to 33,000 barrels, in Quebec to 35,000 barrels, in Ontario to 885,065 barrels, and in British Columbia to 1,057,483 barrels; a total of 4,046,813 being an increase of 664,273 barrels over the production in the previous year. It is calculated that the acreage covered by potatoes this year in the nine provinces is 703,600, or 1,688 acres more than last year.

The small-fruit industry has made notable growth in British Columbia during recent years. An example of this is furnished by the acreage under strawberries which quadrupled in three years. This rapid development has however been accompanied by an equally rapid extension of insect injury, the strawberry root weevil having in some districts assumed serious proportions.

In 1918 an arrangement was arrived at by the Dominion Department of Agriculture with the provincial government for the use of six acres of land in the centre of the strawberry-growing district of Gordon Head, Vancouver Island, with a view to demonstrating systems of crop rotation suitable to strawberry culture and to elucidate if possible the problem of weevil control. The results of the experiments and investigation that have been carried on are told in Pamphlet No. 5, of the Dominion Department.

The Canadian Horticultural Council, which was recently organized with headquarters at Ottawa, has already taken steps towards the organization of a system for the registration of new varieties of plants. Through the agency of Mr. W. B. Lobjoit, Controller of Horticulture for Great Britain, the Secretary of the Canadian Horticultural Council will be kept informed of the efforts being made not only in England but on the Continent, to provide a means for the registration of horticultural plants, shrubs, and trees. The Secretary of the Council has also got into

touch with the horticultural authorities in the United States who are interested in this matter. It is expected that a conference on the subject will be arranged for during the present year.

An investigation by the Canadian Horticultural Council with respect to the supply of nursery stock indicates that there will be a decided shortage of young fruit trees, particularly apple, pear, plum, and cherry, for planting this fall and next spring. The shortage will be greater than last spring when there was not enough planting stock to meet the demand. The shortage is understood to be due to the slackening of nursery work during the war years.

The demonstration farm maintained by the Ontario Department of Agriculture at Monteith in Northern Ontario, is to be abandoned. A larger acreage has been purchased at New Liskeard, where a permanent farm devoted principally to dairying will be operated. The object will be to benefit the settlers of the Temiskaming District and other parts of Northern Ontario where results secured will be applicable. The present Superintendent of the Monteith farm, C. M. Laidlaw, will go to New Liskeard to take charge of the institution.

The land and buildings at Monteith will be taken over by the Department of Education to be operated in connection with the school recently established there. This school has been so successful so far that applications to the capacity of the school for the coming year were received before the close of the present school year.

The Livestock Improvement Trains which ran in Manitoba from May 1 to 26, inclusive, were attended, according to the records kept, by a total of 31,374 persons. Of these 17,615 visited the C.N.R. train and 13,759 the C.P.R. train. The audiences were divided as follows: Men 8,838; women 5,710; boys and girls 16,826.

A total of 124 registered bulls were delivered from the two trains. More bulls could have been sold had it been possible to keep the supply up to normal on both trains at all times. The selection of the bulls was in the hands of the Live Stock Branch of the Dominion Department of Agriculture, and representatives of the various breed associations.

The Live Stock Improvement Trains of 1922 were pronounced a decided success. Their operation should react very beneficially upon the agriculture of Manitoba, not only in connection with the live stock industry itself, but also on farming in general.

The Department of Education of the Province of Saskatchewan is this year conducting a Team Demonstration Contest in Canning. The contest is open to Boys' and Girls' Clubs of the Province and to the Collegiate Institute and public schools of the city of Saskatoon, the Saskatoon Horticultural Society co-operating.

During the two years since Saskatchewan's egg legislation has been in force the quality of eggs marketed in the province has materially improved, and retail merchants, produce dealers and export buyers all testify to that effect, according to a bulletin entitled "Marketing of Eggs," recently issued by the Co-operation and Markets Branch of the Department of Agriculture.

To encourage individual cow testing and herd selection amongst Saskatchewan dairymen, the Saskatchewan Dairy Association in co-operation with the Dairy Branch is this year again conducting a greater average production competition.

During May of the present year 70 school districts in Saskatchewan received trees for school planting under the arrangement between the Department of Education and the Dominion Forestry Branch.

Figures covering the number of homestead entries in Saskatchewan show for 1921 a very heavy increase over 1920, the figures being 2,729 as against 1,841. A total of 7,335 immigrants arrived in Saskatchewan.

A soil survey is being made by the Alberta Department of Agriculture of the territory lying between Nanton and Medicine Hat and having a width of about thirty miles.

Plans which will put weed control in the Province of Alberta on a new basis, have been announced by the Provincial Department of Agriculture. The newly formed plans involve not only appointment of weed inspectors, but also contemplate courses of instruction for these inspectors, and a weed survey of the Province, which will provide a fund of practical knowledge concerning the weeds peculiar to each district, and methods for their eradication. W. J. Stephen, recently appointed crops commissioner for the Province, will have charge of the work.

In the provinces of Nova Scotia and Manitoba, cream is now being paid for on a graded basis. In Nova Scotia a compulsory system of grading cream at the creameries was introduced on May 1. In Manitoba the voluntary system has been adopted.

At the Annual Convocation of the University of Saskatchewan, 1922, Angus MacKay, Indian Head, Superintendent of Experimental Farms, had the degree of Doctor of Laws conferred upon him in recognition of his services to western agriculture.

Eight graduates of the University received the degree of Bachelor of Science (in Agriculture); two, Master of Science (in Agriculture); sixteen students received certificates of Associates in Agriculture, and seven in Household Science.

It has been the policy of the University to provide for the educational needs of the professions within the province. One of the first and possibly the most important decisions of the Senate and Governors was to provide for Agriculture within the University. In this respect Saskatchewan took the initiative in Canada. Two courses are provided in Agriculture—one the Associate Course for farmers' sons, who return to the farm. Since 1912, when the first course was opened, over 430 boys have entered this course. At least 90 per cent are now farming. The other, the Degree Course for specialists in Agricultural Science, has received 136, of whom 29 have taken degrees. This course prepares men for teaching, administrative positions, scientific work, and journalism. Some return to the farm.

At the University of British Columbia the student registration, by years, for the four-year course leading to a degree in Agriculture has been as follows:—1917-8, 7; 1918-19, 17; 1919-20, 45; 1920-21, 51; 1921-22, 73.

Extension schools are held at various centres, the cost of which is met by the Agricultural Instruction grant. In 1918-19 the total registration for these courses was 196; in 1919-20, 570; in 1920-21, 175; and in 1921-22, 732.

The Macdonald College announcement contains full details of the four-year course in agriculture, the "Winter" or one-year course in agriculture and poultry, and the courses in the School of Household Science and the Training-School for Teachers. An outline of the course of study followed is given in each case along with the entrance requirements, fees, etc. Students in the longer agricultural courses from Quebec receive a grant of \$7 a month for each month of attendance during the course, and the Department of Agriculture of the Province of New Brunswick refunds the railway fares of students from that province who, having taken their first and second years at the Nova Scotia Agricultural College, attend Macdonald College to complete the four-year course leading to a degree.

THE AGRICULTURAL GAZETTE OF CANADA

E. G. Hood (O.A.C. 13) Lecturer in Bacteriology at Macdonald College recently received the degree of Doctor of Philosophy from Massachusetts Agricultural College.

The following are among the lines of research work being conducted at the University of Saskatchewan; The decay of concrete through effect of alkali; the soil survey work for the south-western part of the province; the rust investigation work now carried on for the third season, and the wheat breeding experiments carried on by Professor Thompson which is closely related to the rust investigation work. Professor Greig is continuing his research work in connection with wall insulation. Professor Potts is doing special work regarding the pasteurization of milk. A great number of varied experiments with corn, alfalfa, sweet clover and other forage crops, and with cereals, grass and vegetable crops are being carried on at the experimental farm.

Some very interesting research work is being carried on by Professors A. A. Cameron and J. S. Fulton with a species of tick, which is believed to be causing loss of life among live stock as well as big game in the northern part of the province.

The advantages of removing weed seeds from grain at the time the grain is threshed have been generally recognized. Nearly all threshing machines have sieves to remove weed seeds which are smaller than the grain being threshed, but some device for removing the wild oats, cockle, wild peas, and other large weed seeds would be of even greater benefit.

During the past twenty years many attempts have been made to build a recleaner which would clean the grain to a no-dockage basis. The United States Department of Agriculture became interested in this work four years ago, and the experiments developed at least one simple and practical recleaner for threshing machine use.

This year, ten threshing machines are being equipped with recleaners for removing the dockage from wheat and rye at the time the grain is threshed. The recleaners have been located at various points so that a wide range of harvest and threshing conditions will be encountered, and as many different sizes and types of separators have been equipped as can be properly supervised and their efficiency ascertained. Eight of the recleaners are of the disc type, one is of the sieve type commonly used in foreign countries, and the other is an aspirator designed and built by the office of Grain Investigations at Portland, Oregon. This work is being carried on by the United States Department of Agriculture in co-operation with the threshing machine Manufacturers

The American Committee for Devastated France is providing a three months' prize trip to Europe to the canning club girls of the United States. The trainers of the three winning teams will accompany the party. The 55,000 rural girls of the United States who are members of the girls' canning clubs, conducted by the Agricultural Colleges and the United States Department of Agriculture, are expected to compete in the contest. Eight weeks of the trip will be spent in visiting interesting places in France, and in demonstrating canning in the devastated regions under the supervision of the French Department of Agriculture and the American Committee for Devastated France.

The purpose of the contest, according to the regulations, is to encourage the preservation of all available products during the season of abundance; to emphasize, through canning, the importance of a well-rounded diet which will make for farm and rural home efficiency; to stimulate a greater interest in canning clubs, and to determine prize winners worthy of a trip to Europe and capable of demonstrating canning to the French people.

With the object of making the work of live stock judges at summer fairs more uniform, a live stock judges' conference arranged by the extension department at the College of Agriculture, Saskatoon, was held in July just previous to the summer fair season.

The plan with each class of livestock was first to have a demonstration, then present a group of animals for the judges to place, after which full discussion was invited. Interest was increased by the instructors calling on judges to give reasons for their decisions. About twenty-four judges attended.

Approximately one hundred and forty agricultural exhibitions are held in the province each year, and it is very essential that the judges keep up-to-date and maintain a high and uniform standard. Through these fairs, the judges exert a far-reaching influence on stock breeding in the province, and it is likely that such conferences as the one described will be held periodically henceforth.

At the annual meeting of the Royal Society last May, Mr. Arthur Gibson, Dominion Entomologist, was elected a Fellow of the Royal Society of Canada.

Dr. Link, Specialist in Market Pathology of the Bureau of Plant Industry, United States Department of Agriculture, recently visited the chief seed potato producing districts of British Columbia. He was accompanied by Mr. Tice, Potato Specialist of the Provincial Department of Agriculture. Mr. Tice and Dr. Link afterwards visited several districts in the State of Washington.

Dr. Link, whose visit was in connection with seed potato certification work and the virus diseases of potatoes, emphasized the necessity for the early roguing and isolation of seed plots.

The Province of British Columbia is believed to have great possibilities as regards seed potato production, provided the precautions necessary to prevent disease are adopted.

APPOINTMENTS AND STAFF CHANGES

The position of Dominion Agrostologist formerly held by Dr. M. O. Malte, who resigned some time ago to take up work with the Geological Survey of the Department of Mines, has been filled by the appointment of Mr. Gordon P. McKrostie, B.S.A., M.S.A., Ph.D. Born at Metcalfe, Carleton County, Ont., 1887. Graduate of Ontario Agricultural College, 1912. Agricultural Representative, Kent County, 1913-14. Graduate work at Cornell University, Ithaca, N.Y. Plant Breeder for New York State Bean Investigations, 1917-1920. Associate professor of Agronomy, Macdonald College, Quebec, 1920-1922.

Mr. Wm. Moynihan, V.S., formerly Veterinary Inspector at Toronto, has been appointed District Veterinary Inspector to fill the vacancy caused by the transfer of Mr. W. W. Stork, V.S. to Niagara Falls.

The Entomological Branch announces the appointment of Mr. K. M. King, B.Sc., as entomologist for Saskatchewan with headquarters at Saskatoon. The position in Saskatchewan has been vacant since the resignation of Dr. A. E. Cameron in 1920, owing to the fact that it has been impossible up to the present time to find a suitably trained man for the position. Mr. King received his training at the University of Washington and the Montana State College, and received his degree from the latter institution in 1920.

Mr. King has had about three years field experience in entomology and has worked on grasshoppers and the pale western cutworm in Montana; this training fits him particularly

for his work in Saskatchewan. Since April 1920 he has been engaged with the Bureau of Entomology of the United States Department of Agriculture, working on insects affecting field crops.

Mr. King served with the United States army in France.

Mr. Frank L. Gabel, formerly fruit inspector at Hamilton, for the Dominion Fruit Branch, has been promoted to the vacancy caused by the resignation of James L. Hastings as District Fruit Inspector for Western Ontario at Toronto.

The appointment is announced of Miss Jessie MacMillan as director of Women's Extension Work in Alberta. Miss MacMillan is a native of Aberdeen, Scotland, received her education in that city and at the Edinburgh School of Domestic Economy, and is stated to be exceptionally well qualified to look after the interests of women's organizations.

The co-operative experimental work carried on for the past year by farmers in all parts of the province in co-operation with the Provincial Department of Agriculture and the Field Husbandry Department of the University of Saskatchewan, has developed to such an extent that it has been found necessary to secure a director of co-operative experiments to supervise the work carried on, and Mr. Ernest G. Booth, a graduate of the University and president of the Saskatchewan Field Husbandry Association since its formation last year, has been appointed to this position.

ASSOCIATIONS AND SOCIETIES

MARITIME LIVE STOCK CONFERENCE

A conference of outstanding importance to the live stock industry of the Maritime Provinces was held at Moncton early in June. Those in attendance included the Deputy Minister of Agriculture for Canada, Dr. J. H. Grisdale, the Minister of Agriculture for Prince Edward Island, the Hon. W. M. Lea, the Secretary for Agriculture for Nova Scotia, Dr. M. Cumming, the Dominion Live Stock Commissioner, Mr. H. S. Arkell, the Director of the Dominion Experimental Farms, Mr. E. S. Archibald, the Deputy Minister of Agriculture for New Brunswick, Mr. Harvey Mitchell, and other officials both Dominion and Provincial. Dr. Cumming occupied the Chair.

The following resolutions were adopted:—

(1) Resolved that while recognizing that a progressive policy to assist Maritime stock breeders to market their surplus live stock during the fall months has already been put in force, mainly through the leadership of the Live Stock Branch of the Federal Department of Agriculture, we recommend that, as a further constructive measure, the services of an expert live stock market man be, if possible, secured to study movements of live stock to and from markets in the Maritime Provinces with a view to formulating a policy under which these provinces will supply a larger share of their local market needs with their own live stock and also lay the foundation for the further development of an export trade.

(2) Resolved that this convention recommend a greater flexibility on the part of Federal and Provincial Departments of Agriculture in respect to live stock improvement policies with a view to co-operatively adapting these policies to the special conditions in each of the provinces of the Dominion.

(3) Resolved that this convention recommend the appointment of more county or district agricultural representatives in the Maritime Provinces who shall co-operate with the Dominion Live Stock promoters in making their policies further reaching and more continuously effective.

(4) Resolved that this convention recommend that the various Departments advocate the dehorning of commercial beef cattle, either as calves or as mature cattle, and also dairy cattle.

(5) Resolved that this convention recommend that the various Departments

co-operate in stimulating the use of high-class sires and a more rigid culling of females. By renewed and vigorous propaganda through the press and by departmental publications by active effort in the form of scrub bull campaigns when conditions seem at all favourable and by the construction, extension and co-ordination of pure bred sire policies of the provincial and federal departments of agriculture.

(6) Whereas the offering of prizes for a large number of breeds in any one class at exhibitions tends to hinder the concentration of breeders on a few of the best breeds;

Resolved that exhibition commissioners be urged to reduce as much as possible the number of breeds listed for prizes, and that the giving of prizes to breeds that are only represented in the Maritime Provinces by occasional herds be discontinued and that copies of this resolution be sent to all Superintendents of Live Stock and Exhibitions in the Maritime Provinces.

(7) Whereas the locations of the nearest live stock yards are at a greater distance from Maritime farmers than any other farmers in Canada;

And whereas for this reason, the Maritime Province stock raisers feel that they are being discriminated against;

And whereas this condition mitigates against the increased production of live stock;

Resolved that the railway authorities be requested to lower the rates on the shipment of live stock in general, so that they will be placed on equality with live stock raisers in other parts of Canada, and that a copy of this resolution be sent to the Minister of Railways.

(8) Whereas it is imperative that all departments and associations inaugurate active measures toward greater economy of production in live stock and live stock products; And whereas one means of assisting in such work is the availability of reliable information;

Resolved that the convention urge the publishing of two pamphlets, one emphasizing the results of the grading up of herds as carried on by the Experimental Farms in the Maritime Provinces and another giving experiences of our Maritime farmers who have used silos together with cost of construction, etc.

(9) Whereas many farmers in the Maritime Provinces find it difficult to secure abundant roughage; And whereas the value of succulent feed for winter

THE AGRICULTURAL GAZETTE OF CANADA

feeding of cattle has been fully demonstrated; And whereas a larger amount of succulent roughage would reduce the present heavy expense of buying western grain;

Resolved that the use of silos in the Maritime Provinces should be encouraged in every way possible, the crops to be used may vary in different localities, but corn, O.P.V. sunflowers and clovers should be stressed, and that the growing of larger areas of roots should be encouraged where silage crops are not adapted and that some turnips be grown if possible even where silage is the main succulent roughage.

(10) Whereas this convention considers that in order to facilitate the marketing of live stock and its products that cold storage is absolutely necessary;

Resolved that this convention request the Federal Government to give financial assistance in the establishing of one or more cold storage plants in each province.

(11) Whereas it is the opinion of this convention that co-operative shipping of live stock has been satisfactory to shippers in the past;

Resolved that this method of marketing be continued and furthermore that associations be organized and the contract system of selling introduced.

(12) Resolved that if any or each of the Maritime Provinces desire to make a trial shipment of veal to the New York, Boston or Montreal markets and make arrangements for assembling a carload at any central point that the Federal Department of Agriculture be requested to take charge and bear the expense of killing, cooling and placing same on the market.

(13) Whereas it is the opinion of this convention that hogs of the bacon type only should be raised in the Maritime Provinces and only one breed of that type;

Resolved that this convention do recommend farmers to breed Yorkshire hogs only; and that the Provincial Departments of Agriculture be asked to strongly encourage farmers to produce hogs of the Yorkshire breed rather than any other.

(14) Resolved that the number of roughages fed to our live stock should be increased to avoid the result that follows the failure of any one crop. Several roughages have been proven much better than the feeding of a single one. Special emphasis is therefore laid on the growing of roots, silage crops and clover.

(15) Resolved that the importance of home-grown grains should be stressed with special emphasis on the importance of oats, barley and mixed grains as stock feeds in order that the cost of production may be lowered.

(16) Whereas the under-feeding of live stock results in heavy loss from the fact

that the whole ration must be used for maintenance of the animal, leaving nothing or little to be applied to gain in weight or for milk production; And whereas the marketing of thin beef results in a loss in pounds and in price per pound; And whereas this under-feeding is largely the result of more live stock being carried than can be well fed by the amount of feed the farmers are producing;

Therefore recommend that the farmers be encouraged to keep only so much stock as can be supplied with an abundance of feed, and that every effort be made to impress upon farmers the advantages of liberal feeding.

(17) Whereas the live stock records show that the dairy cow and the hog are able to produce the maximum product and profit on feeds available and also that on the majority of farms, conditions justify farming with these classes of stock;

Resolved that this convention take all possible steps toward promoting the continuous production of dairy cattle, the finishing of veal where profitable and the rearing of hogs as an adjunct to dairying. And that in these more limited districts primarily suited to beef and sheep production that the convention take active steps to encourage better breeding and feeding for a higher market finish.

(18) Resolved that this convention recommend that pure bred rams of the Down breeds be used exclusively on all flocks in the Maritime Provinces; And further that since it has been proven that docked and castrated lambs sell to better advantage than lambs not docked and castrated: Therefore we strongly recommend (1) that the practice of docking and castrating be carried out by all sheep breeders in the Maritime Provinces; (2) that the practice of dipping be strongly recommended; (3) that lambs be finished to from 75 lbs. to 95 lbs. before marketing.

CANADIAN SEED GROWERS' ASSOCIATION

The annual meeting of the above Association was held at Macdonald College, Ste. Anne de Bellevue, P.Q. on June 26. In the report of the Board of Directors, it was shown that the number of growers operating in connection with the Association has reached the very creditable number of almost 4,000. In addition to these, it was pointed out that there are many hundreds of farmers throughout Canada who are producing and selling high class seed independent of the Association, but by reason of having been affiliated with it at one time. The amount of Registered Seed produced has reached several hundred thousand bushels. The report indicated that the quantity produced could be increased very largely were proper

THE AGRICULTURAL GAZETTE OF CANADA

facilities provided for handling, marketing and financing the crop. The report of the President indicated that the time has come when some definite action should be taken to overcome this difficulty. The matter was thoroughly discussed at the meeting and following resolution passed:—

"Whereas, the C.S.G.A., a body incorporated without share capital and not permitted to do business with the purpose of financial gain for its members, has grown and developed since its inception twenty years ago until it has to-day over 4,000 active members with an annual production of Registered Seed and Extra No. 1 Seed of several hundred thousand bushels; and, whereas, it is of the greatest National importance that an adequate supply of this class of seed for the needs of the country be assured annually; therefore, be it resolved, that this Association place itself on record as favouring the formation of allied but distinct and separate organizations incorporated to do business and whose primary function shall be directly or indirectly to assemble, reclean, store, finance, and market Registered and Extra No. 1 seed. The Association, therefore, recommends for the consideration of the Ministers of Agriculture of the respective Provinces that warehouses be constructed at convenient centre or centres and made available to seed growers co-operatives on the basis of service at cost after the general plan of the Canadian Government Interior Terminal Elevators for the assembling, storing, clearing, grading and marketing of Registered and Extra No. 1 Seed grain and other seeds by Provincial or district growers co-operatives, and of the Minister of Agriculture for Canada, that, pending the organization of a Canadian Seed Growers' Co-operative, the Seed Purchasing Commission be given authority to take delivery of the surplus Registered and Extra No. 1 seed grain that has been assembled, cleaned, graded, sacked, and held in storage by Provincial Seed Growers' Co-operatives for sale on the volunteer, pooling or other system of co-operative marketing, make reasonable financial advance on same against approved documents, and provide the service of selling and distributing the seed for a moderate commission charge to cover the cost of the service, and to return the net proceeds of sale to the Provincial or district co-operatives for distribution by them to their seed growers."

CANADIAN SOCIETY OF TECHNICAL AGRICULTURISTS

The second annual convention of the Canadian Society of Technical Agriculturists was held at Macdonald College, P.Q. from

June 26 to July 1. A new and important feature was the series of advanced lectures on rural economics, genetics, and animal and plant nutrition. An excursion to the Oka Agricultural Institute concluded the programme. The attendance was good, and the convention was a success in every way.

One of the actions of the convention was the appointment of a committee on Educational Policies, with President L. S. Klink of the University of British Columbia as chairman. The committee, which comprises a representative from each of the provinces, will make a survey of the conditions regarding agricultural education from the rural schools to the colleges of agriculture and will report at the next annual convention.

The executive was by resolution requested to address the Civil Service Commission with a view to obtaining a reconsideration of the classification of agricultural technicians comparable with that of other professions.

Other resolutions passed included one favouring the establishment of a National Research Institute as being essential to the economic development of the Dominion; and one commending the policy and practice of agricultural departments, federal and provincial, of employing in all technical positions men who have had finished training in technical agriculture.

With regard to the Bureau of Records, the General Secretary reported that the number of enquiries so far received from employers has been very small, and in almost every instance these enquiries had called for a man with special, or graduate, training. On the other hand the number of enquiries from registrants seeking positions had been much larger, and always from men who had no training beyond that leading to the B.S.A., degree plus, subsequent professional experience. For this reason the value of the Bureau has been minimized. The men seeking positions could not be placed; the employers seeking men could not find them at the salaries offered, among the registrants.

Government employment did not demand the B.S.A. man in any line of work to the extent that they were required a few years ago. Specialists were called for. This meant that the C.S.T.A. Bureau, to be thoroughly efficient, must include among its registrants a fairly large percentage of highly trained men, which was not the case now. The Society might, it was stated, also attempt to develop new fields for employment for the B.S.A. At present the graduate in agriculture was looked upon, in some quarters, as a book-learned individual, unpractical and inexperienced. This opinion could be largely removed by publicity, and by encouraging commercial firms, co-operative organizations, and other similar institutions, to employ agricultural graduates.

THE AGRICULTURAL GAZETTE OF CANADA

The Society has been admitted to affiliation with the American Association for the Advancement of Science, and selected Dr. W. H. Brittain, of Truro, N.S., as its representative on the Council of that body.

A fellowship was conferred on Dr. L. S. Klink, the retiring President.

Honorary membership was conferred upon His Excellency, Baron Byng, Governor General.

The Special Committees, with their chairmen, are as follows:—*Marketing Education*, Professor A. Leitch, Ontario Agricultural College, Guelph; *Graduate Studies*, Professor Newton, University of Alberta, Edmonton; *Research*, Dr. J. F. Snell, Macdonald College; *Educational Policies*, Dr. L. S. Klink, President, University of British Columbia, Vancouver.

The Dominion Executive of the society is composed as follows:—President, J. B. Reynolds, president of the Ontario Agricultural College, Guelph; vice-presidents, Professor H. Barton, Macdonald College; Jules Simard, Dominion Seed Branch, Quebec; hon. secretary, L. H. Newman, secretary of the Canadian Seed Growers Association, Ottawa; provincial representatives, Alberta, D. H. Galbraith, M.L.A., Vulcan; British Columbia, F. E. Buck, University of British Columbia, Vancouver; Manitoba, A. C. McCulloch, Winnipeg; New Brunswick, J. H. King, Moncton; Nova Scotia, Dr. W. H. Brittain, Truro; Ontario, Arthur Gibson, Dominion Entomologist, Ottawa; Prince Edward Island, J. A. Clark, Experimental Farm, Charlottetown; Quebec, A. Désilets, Department of Agriculture, Quebec; Saskatchewan, J. G. Robertson, Live Stock Commissioner, Regina; general secretary and editor, Fred H. Grindley, P.O. Box 625, Ottawa.

The next annual convention will be held at Saskatoon.

EASTERN LIVE STOCK UNION

In order to promote, encourage and develop the live stock industry, the Eastern Canada Live Stock Union was formed. The Union is a combination of many different organizations engaged in the rearing of livestock and the handling of livestock products, its objects being:—(a) To establish an organization of pure bred and commercial live stock producers; (b) To stimulate economic progress in livestock production and marketing; (c) To co-ordinate the interests of pure bred and commercial producers and handlers of livestock and its products; and, (d) to promote education, co-operation and leadership in the livestock fields.

"The Union may consist of the following Associations interested in livestock and livestock productions of Ontario, Quebec and the Maritime provinces, which have paid

the current year's membership fees: (a) Livestock record organizations; provincial livestock associations; farmers' organizations and co-operative companies or associations; (b) Dominion and provincial Departments of Agriculture; (c) railway companies; bankers' associations; livestock commercial organizations; meat packers' associations; agricultural fair associations; (d) such other organizations as are approved by the Executive Committee."

Owing to the complex nature of the work of the Live Stock Union it was thought advisable to form committees which, while being under the authority of the parent body, are engaged in special work. The Commercial Committee is composed of representative shippers, transportation officers, farmers, representatives of the packing plants, livestock buyers, railway livestock agents, officers of stockyards and an officer of the Humane Society, who are experts in their different lines, and who are, by training, especially qualified to deal with such questions as affect the shipping, transportation, humane handling and other kindred problems pertaining to livestock.

The Swine Committee is composed of prominent men connected with the swine industry. The efforts of the Dominion Department of Agriculture to inaugurate a system of selling hogs by grade, whereby a premium will be paid to those who produce the proper type of bacon hog, bids fair soon to become effective. When this system becomes operative, the work of this Swine Committee will be most important. President, C. W. Gurney; Secretary-Treasurer, J. D. Brien, York Building, Toronto.

CONFERENCE OF ONTARIO AGRICULTURAL REPRESENTATIVES

The fifteenth annual conference of the Agricultural Representatives of the Ontario Department of Agriculture was held at Cobourg, July 4-7.

The conference functioned through Committees dealing with improvements and alterations in the various lines of work undertaken. The committees reported on the following matters:—Boys' and Girls' club work; Cattle Improvement; Acre Profit and Animal Feeding Competitions; Swine Improvement; Experiments and Demonstrations; Judging Competitions; Horse Improvement; School Fairs; Report of committee sent by the department to investigate the county agent and farm bureau work of the State of Michigan.

Miss K. A. McIntosh, Home Demonstrator for Peel county reported on her work since her appointment in 1918. Some 359 meetings, aggregating 15,800 persons had been addressed and 2,820 persons had called at the office for advice.

Resolutions were passed recommending an extension by the Dominion Department of Agriculture of the food inspection service to those centres where no inspection is provided; suggesting the desirability of holding an annual conference in Northern Ontario having regard to the great agricultural possibilities of the country and the general lack of knowledge as to its extent and resources.

WESTERN PLANT QUARANTINE BOARD

At the meetings of the Western Plant Quarantine Board which were held in Sacramento, California, on May 31 and June 1, 2 and 3, Canada was represented by Mr. W. H. Lyne, Chief Plant Products Inspector for British Columbia and Mr. L. S. McLaine, Secretary of the Destructive Insect and Pest Act Advisory Board, Department of Agriculture, Ottawa. The Western Plant Quarantine Board was organized in 1919 for the purpose of bringing together the quarantine officials of the various western states and British Columbia, in order to bring about a better understanding of quarantine conditions.

Representatives were present from the Federal Horticultural Board, Washington, D.C., Arizona, California, Canada, Colorado, Hawaii, Idaho, Lower California, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming. The first day of the meetings was devoted to a "Hearing," with the Representatives of the Federal Horticultural Board, on problems pertaining particularly to the western states, the main topics were the Mediterranean Fruit Fly, White Pine Blister Rust and the Alfalfa Weevil. The following sessions were devoted to papers and general discussions on problems affecting particularly the western United States and Canada. All states are endeavouring to check the spread of the Alfalfa Weevil as much as possible, not only by the establishment of embargoes and quarantines on plant products likely to harbour this pest, but many states inspect the equipment of "auto campers" entering their territory and coming from regions infested by this insect. Canada is particularly interested in the Alfalfa Weevil, owing to the rapid development of the alfalfa industry in the prairie provinces and British Columbia.

The Honourable G. H. Hecke, Director of the State Department of Agriculture of California, entertained the delegates and guests at a reception at his estate "Yolanda," Woodland.

WESTERN CANADA IRRIGATION ASSOCIATION

The Sixteenth Annual Convention of the Western Canada Irrigation Association was held at Maple Creek, Saskatchewan, and Brooks, Alberta, from July 25 to July 29.

The growth of the interest in irrigation was indicated by the large attendance at the convention, more than 375 delegates and guests registering. Valuable addresses were given by many able speakers on various subjects dealing with irrigation agriculture and irrigation engineering. Among the speakers were Don. H. Bark, Dean Howes, F. W. Hanna, Geo. H. Hutton, Professor Roy Hanson, G. N. Houston, W. C. Muldrow, Manager of the Columbia Irrigation District, Washington, Walter Packard, Superintendent of the Durham Colony Settlement in California, and I. D. O'Donnell, of Billings, Montana.

Those attending the convention had an opportunity of seeing some of the results of irrigation development at Brooks. Though settlement here is very recent a remarkable transformation has already been effected in a short time. Trees are growing rapidly, while grain and green alfalfa fields meet the eye everywhere.

Resolutions were passed dealing with further irrigation extension, better weed control, and the providing of courses in irrigation engineering at the Western universities. Penticton, British Columbia, was chosen as the place of meeting for the convention in 1923.

The Ontario Co-operative Dairy Products Limited—Officers: President, Jno. Beatty, Mallorytown; Vice-President, D. Hogan, Perth; Secretary-Treasurer, E. H. Stonehouse, Weston; Members of Executive Committee: J. A. McFeeters, Toronto; W. W. Ballantyne, Stratford; Wm. Newman, Lorneville; D. L. Gibson, Caledonia; A. H. Clark, Mountain; Geo. Smith, Iroquois.

NEW PUBLICATIONS

DOMINION DEPARTMENT OF AGRICULTURE

Cereal Division, 1921.—Interim Report of the Dominion Cerealists, C. E. Saunders, B.A., Ph.D., LL.D., Dominion Experimental Farms.

Bee Division, 1921.—Interim Report of the Dominion Apiarist, C. B. Gooderham, B.S.A. Dominion Experimental Farms.

Division of Illustration Stations, 1921.—Interim Report of the Chief Supervisor, J. Fixter. Dominion Experimental Farms.

Experimental Station, Scott, Sask., 1921.—Interim Report of the Superintendent, M. J. Tinline, B.S.A. Dominion Experimental Farms.

Experimental Farm, Agassiz, B.C., 1921.—Interim Report of the Superintendent, W. H. Hicks, B.S.A. Dominion Experimental Farms.

Experimental Station, Invermere, B.C., 1921.—Interim Report of the Superintendent, R. G. Newton, B.S.A. Dominion Experimental Farms.

Dressing and Cutting Lamb Carcases.—By A. A. MacMillan, B.S.A., Chief, Sheep and Swine Division, and W. J. Howard, Meat Demonstrator, Live Stock Branch. Pamphlet No. 8—New Series.

Insects Affecting Greenhouse Plants.—By Arthur Gibson, Dominion Entomologist, and W. A. Ross. Bulletin No. 7—New Series.

Bovine Tuberculosis.—Pamphlet No. 16.—New Series. Health of Animals Branch.

Selection of Lamb Cuts.—Directions for cooking. By A. A. MacMillan, B.S.A. Chief, Sheep and Swine Division, Live Stock Branch. Pamphlet No. 9—New Series.

Feeds for Wintering and Winter Fattening of Beef Cattle in Eastern Canada.—By G. W. Muir, B.S.A., Animal Husbandman. Exhibition Circular No. 106. Dominion Experimental Farms.

Growing Feeds for the Winter Feeding of Beef Cattle in Northwestern Saskatchewan.—By M. J. Tinline, B.S.A. Exhibition Circular No. 107. Dominion Experimental Farms.

Fertilizers for Field Crops.—Their Nature Functions and Results from Recent Experiments in Canada. By Frank T. Shutt, M. A., D.Sc., and B. Leslie Emslie, C.A.D.,

F.C.S., Division of Chemistry. Bulletin No. 8—New Series. Dominion Experimental Farms.

Keeping Dairy Herd Records.—Pamphlet No. 13—New Series. Dairy and Cold Storage Branch.

Illustration Community Work in Dundas County, Ontario.—By F. C. Nunnick, B.S.A., Chief, Division of Extension and Publicity, Dominion Experimental Farms Branch. Reprint from Agricultural Gazette, July-August.

List of Wholesale Dealers in Fruits and Vegetables in Canada.—(Revised edition). Compiled by the Fruit Branch. Bulletin No. 9—New Series.

Record of Performance for Poultry.—Section "A." Rules and Regulations, Record Year 1922-23. Poultry Division, Live Stock Branch.

How to Caponize.—By Geo. Robertson, Assistant Dominion Poultry Husbandman, and W. W. Lee, Poultry Husbandman, Pamphlet No. 12—New Series. Dominion Experimental Farms.

Mosaic and Leaf Curl of the Cultivated Red Raspberry.—By W. H. Rankin, Ph.D., and J. F. Hockey, B.S.A., Laboratory of Plant Pathology, St. Catharines, Ont. Circular No. 1—New Series. Division of Botany, Dominion Experimental Farms.

Root and Storage Cellars.—By A. V. Nicholson, Draughtsman, Central Experimental Farm. Pamphlet No. 10—New Series.

The Morphology and Biology of a Canadian Cattle-Infesting Black Fly.—By A. E. Cameron, M.A., D.Sc., F.E.S., Entomologist-in-charge for Saskatchewan. Bulletin No. 5—New Series.

Experimental Station, Fredericton, N.B. 1921.—Interim Report prepared by E. M. Taylor, B.S.A., Assistant to Superintendent.

ONTARIO

Live Stock Branch, 1290.—Annual Report.

Entomological Society of Ontario, 1920.—Fifty-first Annual Report.

Stallion Enrolment Board of Ontario.—Report 1921.

Ontario Vegetable Growers' Association, 1921.—Seventeenth Annual Report.

THE AGRICULTURAL GAZETTE OF CANADA

Agricultural Societies, 1921.—Appendix to Annual Report. Results of competitions in Standing Field Crops and Prize-winning Grain at Winter Fairs, Canadian National and Central Canada Exhibitions.

Silos and Silage.—By L. Stevenson, B.S. A., M.S. Bulletin No. 287.

Flour and Breadmaking.—By R. Harcourt and Miss M. A. Purdy. Bulletin No. 285. Revised edition of No. 180.

QUEBEC

Annual Meeting of the Pomological and Fruit Growing Society, 1921.—Supplement to the report of the Minister of Agriculture.

MANITOBA

Annual Report of the Department of Agriculture and Immigration, 1921.

SASKATCHEWAN

Community Buildings.—Bulletin No. 70. Co-operation and Markets Branch.

Marketing Eggs in Saskatchewan.—Bulletin No. 69. Co-operation and Markets Branch.

ALBERTA

The Summerfallow in Southern Alberta.—By James Murray, District Agent, Agricultural Department, Medicine Hat.

BRITISH COLUMBIA

Agricultural Statistics, 1921.—Bulletin No. 89.

Peat and Muck Soils.—By Wm. Newton, Chief Soil and Crop Inspector. Circular No. 39.

MISCELLANEOUS

Three Lessons on Bird Protection.—Issued by the Dominion Parks Branch, Department of the Interior.

The Protection of Bird Neighbours.—By Hoyes Lloyd.

The Birds of a Manitoba Garden.—By Norman Criddle.

Canada's Feathered Friends.—By Hoyes Lloyd.

Birds a National Asset.—Views of Provincial Ministers of Agriculture. Dominion Parks Branch, Department of the Interior.

Bird Houses and Their Occupants.—By P. A. Taverner.

The Canadian Swine Breeders' Record.—Volume 32, 1921. Compiled and edited in the office of the Canadian National Live Stock Records.

The Canadian Jersey Cattle Club Record.—Volume 5, 1922. Compiled and edited in the office of the Canadian National Live Stock Records.

Canadian National Records for Sheep.—Volume 10, 1921. Compiled and edited in the office of the Canadian National Live Stock Records.

Holstein-Friesian Herd Book.—Volume 25. Containing a record of all Holsteine Friesian cattle.—W. A. Clemons, Secretary and Editor.

THE LIBRARY

LIST OF PRINCIPAL ACCESSIONS TO THE DEPARTMENTAL LIBRARY, INTERNATIONAL INSTITUTE BRANCH, DEPARTMENT OF AGRICULTURE

Cyclopedia of Farm Animals, edited by L. H. Bailey. Toronto, Macmillan company of Canada, 1922. 708 pp. il.

Weather Prediction by Numerical Process, by Lewis F. Richardson. Cambridge University press, 1922. 236 pp. diagrs.

Refrigeration, Cold Storage and Ice-making, by A. J. Wallis-Taylor 6th edition, revised. London, Crosby Lockwood & son, 1920. 652 pp. il. diagrs.

Les Dommages Causés aux Cultures par les Usines d'Electro-chimie, par Dr. Henry Faes. Paris, Librairie Payot et cie. 1921. 104 pp.

The Fiscal and Diplomatic Freedom of the British overseas dominions, by Edward Porritt. Oxford, Clarendon press, 1922. 492 pp. (Carnegie Endowment for International Peace).

Field Key to the Genera of the Gill Mushrooms, by Louis C. C. Krieger. Baltimore, Norman, Remington co. 1920.

North America; its Agriculture & Climate, by Robert Russell. Edinburgh, Adam & Charles, 1857. 390 pp. maps.

Art Out-of-Doors, by Mrs. S. Van Rensselaer. New York, Charles Scribner's sons, 1893. 399 pp.

Concrete Products, their Manufacture and Use, by W. R. Harris and H. C. Campbell. Chicago, International trade press, 1921. 282 pp.

Meteorology; an Introductory Treatise, by A. E. M. Geddes, O.B.E., M.A., D.Sc. Lecturer in natural philosophy in the University of Aberdeen. New York, D. Van Nostrand co. 1921. 390 pp. il.

English Farming, Past and Present, by The Right Hon. Lord Ernle, President of The Board of Agriculture & Fisheries, 1916-19. New York, Longmans, Green & co. Third Edition, 1922.

The Feeding of Dairy Cattle, by Andrew C. McCandlish, M.S.A., Professor of Dairy Husbandry, Iowa State College. New York, John Wiley & sons, 1922. 281 pp. il.

Why Europe Leaves Home, by Kenneth L. Roberts. Indianapolis, Bobbs-Merrill co' 1922. 356 pp. il.

Helping Men Own Farms, by Elwood Mead' Professor of rural institutions, University of California. Toronto, Macmillan co. of Canada, 1920. 228 pp. il.

Organizing the Community: A Review of Practical Principles, by B. A. McClenahan, M.A., Asst. Director, Missouri School of Social Economy, St. Louis. New York Century Co. 1922. 260 pp.

Physico-Chemical Problems Relating to the Soil; a general discussion held by the Faraday Society. (Reprinted from the Transactions of the Faraday Society, Vol. 17, Feb. 1922. p. 317-268).

Les Engrais; Emploi Raisonné et Lucratif, par A. Ch. Girard, Professeur à l'Institut National Agronomique. Paris, Librairie agricole de la maison rustique, 1922. 164 pp.

Le Rôle de L'Osmose en Biologie; Essai de Physique Végétale, par Leclerc du Sablon. Paris, Ernest Flammarion, 1920. 190 pp.

Lecture on Modern Applications of Chemistry to Crop Production, by Dr. E. J. Russell, O.B.E., D.Sc., F.R.S. (Director of Rothamsted Experimental Station) London, 1922. 23 pp.

Potash, by Sydney J. J. Johnstone, B.Sc. (London) A.E.C., Scientific and Technical Department, Imperial Institute. London, John Murray, 1922. 122 pp. Bibl. pp. 114-122. (Monographs on mineral resources with special reference to the British Empire).

A Textbook on Tobacco, by Carl Werner. New York, Tobacco Leaf Publishing Co., 1914. 323 p., il.

The American Rose Annual, 1921, edited by J. H. McFarland. Harrisburg, Pa., American Rose Society, 1921. 192 p., il.

The American Rose Annual, 1922, edited by J. H. McFarland. Harrisburg, Pa., American Rose Society, 1922. 192 p. il.

The Fundamentals of Fruit Production, by V. R. Gardner, F. C. Bradford and H. D. Hooker, Jr. of the Dept. of Horticulture, University of Missouri. New York, McGraw-Hill Book Co., Inc., 1922. 686 p. il.

The Hand Book on Pruning, Grafting and Budding, by James Udale, Chief Horticultural Instructor for Worcestershire. Evesham, England, W. & H. Smith, Ltd., fifth edition, 1921. 146 p. il.

Landscape Gardening, Designed Especially for the Use of Non-Professional Students, by Frank A. Waugh. New York, John Wiley & Sons, Inc. 1922. 344 p. il.

Common Plants, by Macgregor Skene, D Sc., Lecturer on Plant Physiology, Aberdeen University. New York, Andrew Melrose, Ltd., 1921. 271 p. il.

La Laiterie, par Louis Ammann, Professeur a l'Ecole de Grignon. Paris, Librairie agricole de la Maison Rustique, 1922. 630 p. paper.

Dairy Farming on Arable Land. Liverpool, R. Silcock & Sons, Ltd. 144 p.

Dairy Farming, by J. C. Newsham, Principal of Monmouthshire agricultural Institution. London, C. Arthur Pearson, Ltd., 1920. 174 p.

Dairying in the Netherlands; a Study and a Comparison, by R. A. Whyte, Inspector, Dept. of agriculture and technical instruction for Ireland. Dublin, Alex. Thom & Co., Ltd., 1922. 36 p. il.

The Book of Ice-Cream, by Walter W. Fisk, Assistant Professor of Dairy Industry, New York State College of Agriculture. Toronto, The Macmillan Co., 1919. 302 p. il.

The Book of Live Stock, by Wade Toole, B.S.A., Professor of Animal Husbandry, Ontario Agricultural College. Toronto, Musson Book Co., Ltd., 1921. 381 p. il.

Insect Pests of the Horticulturist: Their Nature and Control. Vol. 1. Onion, carrot and celery flies, by K. M. Smith, A.R.C.S., D.I.C. adviser in agricultural entomology, Manchester University, and J. C. M. Gardner, A.R.C.S., D.I.C., F.E.S. Imperial College of Science and Technology, South Kensington. London, Benn Bros., Ltd., 1922.

Insect Pests of Farm, Garden and Orchard, by E. Dwight Sanderson & L. M. Peairs. New York, John Wiley & Sons, Inc. 1921. 707 p. il.

Catalogue of Indian Insects, Part I. Acrydidae (Tettigidae), by T. Bainbrigge Fletcher, R.N., F.L.S., F.Z.S. Calcutta, Government printing, 1921. 40 p.

Habitudes et Métamorphoses des Insectes, par E. L. Bouvier. Paris, Ernest Flammarion, 1921. 321 p.

European Animals; Their Geological History and Geographical Distribution, by R. F. Scharff, Ph.D., B.Sc. London, Constable & Co., Ltd., 1907. 258 p. il.

British Animals Extinct Within Historic Times, by James Edmund Harting, F.L.S., F.Z.S. London, Trubner & Co., 1880. 258 p. il.

Comparative Electro-Physiology-Physico-Physiological Study, by Jagadis Chunder Bose, M.A., D. Sc. New York, Longmans, Green & Co., 1907. 760 p.

Organization—Publicity Plan Book for County Farm Bureaus. Chicago, American Farm Bureau Federation, 1922. folio.

Organized Produce Markets, by J. G. Smith, M.A. (Dublin), Assistant Professor of Commerce, University of Birmingham. Toronto, Longmans, Green & Co., 1922. 238 p.

The Public Service in War and Peace, by Sir William Beveridge, K.C.B. London, Constable & Co., Ltd., 1920. 63 p.

Deutsches Wörterbuch, by Moriz Heyne. Leipzig, S. Hirzel, 1905. 3 vols.

A Dictionary of Scientific Terms, by I. F. Henderson, M.A., and W. D. Henderson, M.A., B.Sc. London, Oliver and Boyd, 1920. 354 p. cloth.

Open-Air Studies in Bird Life: Sketches of British Birds in Their Haunts, by Charles Dixon. London, Charles Griffin & Co., Ltd., 1922. 280 p. il. col. plates.

The Geology of the British Empire, by F. R. C. Reed, M.A., Sc.D., F.G.S., F.R.G.S. London, Edward Arnold, 1921. 480 p. maps.

Perfumes, Essential Oils and Fruit Essences Used for Soap and Other Toilet Articles, by Geoffrey Martin, D.Sc., Ph.D., F.I.C. New York, D. Van Nostrand Co., 1921. 138 p.

The Rose Encyclopedia, by T. Geoffrey W. Henslow, M.A., F.R.H.S. organizing secretary, Royal international horticultural exhibition, Chelsea, 1912. Vickery, Kyrle & Co., Ltd., 1922. 441 p. il.

Canada and Its Provinces, by One Hundred Associates. Adam Shortt, Arthur G. Doughty, General Editors. Authors' edition printed by T. & A. Constable at the

Edinburgh University Press for the Publishers' Association of Canada Limited. Toronto 1913-14. 23 vols.

A history of the Canadian people and their institutions.

Some of the most important contributions to agriculturists are: Immigration and population, by W. D. Scott; National aid to the farm, by J. A. Ruddick; General economic history, 1867-1912, by O. D. Skelton; Agriculture in the Maritime Provinces, by M. Cumming; Three centuries of agriculture, by J. C. Chapais; History of farming, by C. C. James; Economic resources of Manitoba, by W. J. Black; Economic resources of Saskatchewan, by W. J. Rutherford; Economic resources of Alberta, by George Harcourt; History of farming, by R. E. Gosnell.

The Restoration of Agriculture in the Famine Area of Russia, translated from the Russian by Eden & Cedar Paul. London, Russian trade delegation, 1922. 167 pp.

A History of British Agriculture, by John Orr. London, Oxford University press, 1922. 96 pp. il.

Agricola, by W. E. Heitland, M.A. Cambridge, University Press, 1921. 492 pp.

A study of agriculture and rustic life in the Greco-Roman world from the point of view of labor.

Toadstools and Mushrooms of the Country Side, by Edward Step, F.L.S. London, Hutchinson & co. n.d. 143 pp. il. col. plates.

A Book on Vegetable Dyes, by Ethel M. Mairct. 3d ed. Bibl. pp. 136-9. Ditchling, Sussex, St. Dominics Press, 1920. 148 pp.

Plant Response as a Means of Physiological Investigation, by Jagadis Chunder Bose, M.A., D.Sc. New York, Longmans, Green & Co. 1906. 781 pp. il. diagrams.

Researches on Irritability of Plants, by Jagadis Chunder Bose, M.A., D.Sc., C.S.I. New York, Longmans, Green & Co. 1913. 376 pp. il.

Genetics, by H. E. Walter, Associate Professor of Biology, Brown University. Toronto, The Macmillan co. 1920. 272 pp. il.

The Natural Resources Question, by Chester Martin, Professor of History, University of Manitoba. Winnipeg, King's printer, 1920. 148 pp.

Sharing Profits with Employees, by James A. Bowie, M.A. Lecturer in Economics, College of Technology, Manchester. Toronto, Sir Isaac Pitman & Sons, Ltd. 1922. 230 pp.

Agricultural Co-operation in England and Wales, by W. H. Warman. London, Williams & Norgate, 1922. 204 pp.

Technical Survey of Agricultural Questions— Geneva International Labour Office, 1921. 623 pp. paper.

Recueil de Coefficients et D'Equivalences.— Rome, International Institute of Agriculture, third edition, 1922. 191 pp. paper, 50c.

International Yearbook of Agricultural Statistics for the Years 1909 to 1921.—The International Institute of Agriculture. Rome, Italy, 1922. 700 pp. paper. \$2. Postpaid.

Heavy Horses—Breeds and Management, by Herman Biddell and others. London, Vinton & co. 1919. 219 pp. il.

Light Horses—Breeds and Management, by W. C. A. Blew, M.A. and others. London, Vinton & co. 1919. 226 pp. il.

Farm Blacksmithing, by John F. Frieze, Head of the Machine Shop and Forging Departments, Technical High School, St. Cloud, Minn. Peoria, Ill. Manual Arts Press, 1921. 92 pp. il.

The Play Movement in the United States, by Clarence E. Rainwater, A.M., Ph.D., Chicago, University Press, 1922. 371 pp. il.

The Modern Farm Hen, by Chesla C. Sherlock. Des Moines, Homestead co. 1922. 236 pp. il. cloth.

Horses, Asses, Zebras, Mules and Mule Breeding, by W. B. Tegetmeier, London, Horace Cox, 1895. 166 pp. il.

American Squab Culture, by E. H. Eggleston. 2d ed. revised. Warrenton, Mo. 1921. 278 pp. il.

Guide to the Primitive Breeds of Sheep and Their Crosses, by H. J. Elwes, F.R.S. Edinburgh, R. & R. Clark, Ltd. 1913. 69 pp. il.

PART V

The International Institute of Agriculture

FOREIGN AGRICULTURAL INTELLIGENCE

All communications in regard to this section should be addressed to T. K. Doherty,
International Institute Commissioner, Department of Agriculture,
West Block, Ottawa.

SCIENCE AND PRACTICE OF AGRICULTURE

GENERAL INFORMATION

International Year Book of Agricultural Statistics for the Years 1909 to 1921.—International Institute of Agriculture. 700 pages. Rome, Italy, 1922.

The most complete work of its kind published. Contains statistics of territorial areas, population, density for years nearest to 1911 and 1921. Territorial areas subdivided agriculturally (1) into productive and non-productive land, with details for years nearest to 1911 and 1921; (2) subdivisions of productive area for years mentioned; (3) subdivisions of arable land on similar basis. Crop areas and yields—(1) area, production and yield per hectare of each country and in each year from 1909 to 1921, for wheat, rye, barley, oats, maize, rice, potatoes, sugar (beet and cane), vines and wine, olive, coffee, cocoa, tea, hops, tobacco, cotton, flax, hemp, jute, rapeseed mulberry, silk production in various stages; (2) area, production and yield per hectare as above, averaged in periods 1909 to 1913, 1914 to 1918 and 1919 to 1921, in each country, each continent and for the world in general, with proportionate percentages. Live stock—(1) numbers of horses, asses, mules, cattle and buffaloes, sheep, goats, pigs and other animals in each country and each year from 1909 to 1921; (2) number, as above, for years nearest to 1911 and 1921, in each country and continent and for the world in general, compared with population and areas. International trade in products of the soil—(1) imports and exports for each country and year from 1909 to 1921, wheat, wheat flour, rye, rye meal, barley, oats, maize, rice, potatoes, grapes, raisins, olive oil, coffee, tea, cocoa, hops, cotton, jute, linseed, rubber; (2) imports and exports as above, averaged in periods 1909 to 1913, 1909 to 1918, 1919 to 1921 for each country and continent and for the world in general. Prices—weekly prices during the years 1912 to 1921 on the leading markets: wheat, rye, barley, oats, maize, rice, sugar, coffee, tea,

cocoa, cotton. Ocean rates of freight for grain and cotton—weekly quotations during the years 1912 to 1921 on the principal traffic routes. Fertilizers and products utilized in agriculture—output in each country and year from 1909 to 1921; natural phosphates, super-phosphates of lime, basic slag, guano, salts of potash, nitrate of soda, nitrate of lime, sulphate of ammonia, cyanamide of calcium, sulphur, sulphate of copper; (2) imports and exports for each country and year from 1909 to 1921; (3) weekly prices during 1918 to 1921 on the leading markets. Rates of exchange and tables of equivalents.

The Year Book is arranged for the use of both English and French readers. It may be obtained from the Secretary-General, International Institute of Agriculture, Rome, Italy. Price \$2.

Agricultural Research and the Farmer.—WILKINS, V. E. Published by *The Ministry of Agriculture and Fisheries*, London, England. 1922.

Describes in non-scientific language the main lines of agricultural research now in progress in Britain. In his introduction the author explains the meaning of the term "research" as follows: "The word is often used by agriculturists in reference to any investigations which have as their object the improvement of existing practice. Thus experimental work in manuring, the testing of varieties, and so on, are spoken of as research. Strictly speaking, however, experimental work of this character is not research. Biological research, in the true sense of the word, aims at finding out the why and the wherefore; it investigates principles. Later on, when such principles have been established, the scientist can use them as a basis for experimental work, and thus in due course the farmer reaps the benefit. No hard and fast line can however be drawn between research and experiment, and some of the investigations being conducted at Research Institutions are experimental in character—

that is, they aim for example at finding out the results of methods of treatment selected more or less at random, rather than at establishing the principles on which scientific treatment should be based. While this type of enquiry may appeal with greater force to the farmer, it is only rendered possible if there is a sound basis of abstract research. Experimental work aims at getting practical results; research endeavours to find out fundamental principles; and the greatest need at the present time is for the establishment of more principles on which reasoned experiments may be based. This class of work, however, is usually highly technical; it is not easily described in popular language, and it is sometimes remote from practical application."

In the chapter on the soil and its effect on plant growth the author states: "If the peoples of the earth are to live an existence under which the fight for food is not the dominant issue of life—if, in other words, the increase in population is to be accompanied by a corresponding increase in the amount of food obtained from the soil—then, as an essential, we must increase our knowledge of the structure and properties of the soil and of the conditions under which we can secure still higher yields of the fruits of the earth. This, from the standpoint of mankind, is the justification for all agricultural research, or rather, the reason why such research must of necessity be prosecuted. The British farmer cannot be expected, perhaps, to view the matter from quite this broad standpoint; but for him a good and sufficient reason for the conduct of research is that ultimately it will enable him to cultivate his ground to better advantage, to secure an increased output, and hence to hold his own against foreign competitors, and obtain better financial returns for his labour. The old adage, 'knowledge is power,' applies with as much force to agriculture as to any other profession. To the farmer, experience, is undoubtedly an invaluable asset, but agricultural practice, like everything else, changes with changing times, and experience is robbed of half its value unless supplemented by the knowledge which can only be given by research into the hidden mysteries of plant growth."

The following is a summary of some of the chapters in the book: (a) *The Soil and its Effect on Plant Growth*.—This fundamental subject has been entrusted to the Rothamsted Experimental Station, which is concerned, among other things, with the examination of the soil in its relation to bacteria and protozoa, and an account is given of the arduous nature of the research along these lines. The nitrification of organic nitrogen alone has demanded the services of eight research workers, who in many cases have worked night-and-day shifts. An interesting

form of investigation undertaken at this station is concerned with the production of artificial farmyard manure. During the later stages of the year, and subsequently, until the agricultural policy of the Government was altered, there was a prospect of a superabundance of straw, more, in fact, than could be dealt with as food and litter by farm animals. The Rothamsted investigators set about devising a means of converting this straw directly into farmyard manure, (1) and the results are most encouraging, although now, with the reduced area of tillage land, the necessity of such conversion is no longer pressing.

At the same station much work has been done on the influence of colloids on the water-content of soil, and on the mechanical operations concerned with tillage. Most ingenious electrical methods are also being exploited to determine the relation between soil acidity and crop production, and the list of publications that have been issued from Rothamsted during 1920 and 1921 shows the extraordinarily varied character of the work being conducted at this famous station. (b) *Plant Breeding*.—The problems that are being investigated along this line are concerned with the baking qualities or strength of English wheat, with the production of cereals possessed of a straw stiff enough to stand up under adverse circumstances, with immunity to disease, with the increase of the number of grains in the ear, with the production of hardier varieties of winter oats, with the relationship of nitrogen in barley grain to the quality of the produce, and with the production of potatoes immune to wart disease. These problems are being dealt with chiefly at Cambridge; while Aberystwyth, the Welsh plant-breeding station, is concerned principally with the discovery of the production of new and improved herbage plants which must be so important in the West of England from the point of view of pasture and meadows. (c) *Plant Physiology*.—The chapter on this subject opens with a suggestive discussion on the fundamental principles involved in crop production. These principles are concerned with the causes that determine heavy cropping and light cropping, resistance to disease, and the formation of flower-buds on fruit-trees. The electrical treatment of crops is also receiving attention at Rothamsted, the Harper Adams Agricultural College, and on a station near Dumfries. To quote from the report, "There is no doubt that electrical discharge will increase plant growth, and it is hoped that it will be found possible to continue the patient experimental work that has been going on for some years, for it seems certain that sooner or later electricity must play an important part on the farm in increasing crop production." (d) *Fruit-growing and Preserving*.—Fruit problems

(1) See article on "Artificial Farmyard Manure" at page 447

are being dealt with mainly at the horticultural station at Long Ashton and at East Malling in Kent. Much suggestive work has been done on the problem of fruit stocks, a subject that has hitherto been very confused and unsatisfactory. The Paradise stock, for instance, has been proved to be a mixture of several varieties, and it would appear that even the crab stock may be graded into several classes, each of which has a distinct influence on the scion that is grafted or budded on to it. This subject is inseparably connected with the development of the root system, a line of research to which the late Mr. Pickering gave much attention, showing that it was quite unnecessary to give the amount of attention that is usually bestowed upon planting. The unexpected result appears to have been confirmed at Long Ashton, the original root system playing practically no further part in the growth of the transplanted tree, which seems to develop a new root system independent of the old. Work on ringing, pruning, dis-budding, etc., also promises to have an influence on commercial production, while much light is being thrown upon the problem of manuring of fruit. This station has also contributed largely to our knowledge of the factors that determine the production of high-grade cider and perry. (e) *Plant Diseases*.—In no department of the Ministry's scheme has more activity been shown than in the direction of plant diseases. At the School of Botany in Cambridge special attention has been given to the silver leaf disease, a trouble that is increasing markedly in this country, and is now no longer confined to plums, but has spread to apples and other fruit-trees. How destructive the disease may be is proved by the fact that an apple orchard of about 6 acres, near Wisbech, showed more than 1,000 trees attacked by this disease, the cause being attributed to carelessness in pruning and the neglect to protect the wounds thus caused.

There are chapters on animal husbandry, animal breeding, dairying, animal diseases, and farming as a business, in the discussion of which subject the author states: "The subject which has so far engaged the larger share of attention at the Institute, (1) on account of its prime importance, is cost accounting; in other words, the development of a system of book-keeping which will enable a farmer to ascertain the profit arising from each productive department of his farm, and thus to criticise his own management and to see in what way it could be modified with financial advantage to himself. It is not enough to know approximately what profit is being made on the farm as a whole; this information is, of course, valuable, and many farmers are now having accounts kept on these lines, partly for income tax purposes, and thus have the

advantage of knowing how they stand financially at the end of the year. But the result gives no indication as to how any particular branch of farming compares with another branch, and experience of costing shows that the farmer who thinks he can judge of this from experience and from a study of prevailing market prices is often at fault in his conclusions. Certain concrete examples of this, chosen from farms for which accounts were kept by the Oxford Institute, may be quoted. A South-Midland farmer, who was under the impression that he was making money on sheep, found that actually his flocks involved him in a loss of about £600 during the year. This was for the year ending Lady Day, 1921, and therefore before the present severe slump in prices of sheep, and the loss was directly attributable to the heavy wages bill which was incurred in this department of his farm. The farmer has decided to continue sheep farming for another year, and if it still shows a loss he will consider the question of altering his system of farming. In the case of this farm, also, the accounts revealed a possible wastefulness in the old custom of paying wages partly in cash and partly in kind; for it was shown that the bailiff, whose wages in cash were about £150 a year, was actually receiving the equivalent of £400 a year in allowances, thus bringing his total wage to over £11 a week. Another case is that of a Sussex farmer, who was firmly convinced that his profits were derived from his store beasts. The first year's accounts showed that he had lost nearly £200 from these cattle; in the second year, the loss was slightly greater. He therefore decided to alter his policy, and has gone in for dairying, which pays him extremely well. The accounts of this farm also showed that his methods of controlling the feeding of the stock were open to criticism; the rations were admirable, but the stock were actually consuming 30% more than their prescribed rations. This was rectified in the following year, with the result that the margin of waste due to errors in feeding was reduced to five per cent.

"The above examples illustrate the case for cost accounting. It is realized, of course, that farming is a complicated business, and that the farmer has not the freedom of the manufacturer in the direction of closing down unprofitable articles of production; yet a good deal can be done, within certain limits, to develop the system of farming in the direction of the more profitable lines, given a knowledge of the financial results obtained in each productive department of the farm. The farm records and analyzed costs of each important product enable the farmer to judge of the relative financial advantages of various farming processes in a way that neither scientific knowledge nor

¹Institute for Research in Agricultural Economics.

practical experience can do unaided. He can test the efficiency of various forms of power; he can check the management of horse labour by the record of idle days and their distribution throughout the season; he can check his direction of manual labour by an examination of the percentage cost of labour in any total product-cost when compared with other published results for the same product or with the results of former years on his own farm; he can check the efficiency of feeding and manuring; he can keep control of the issue and use of materials of every kind, feeding stuffs, manures, tools and parts, etc., and thus prevent their careless use and consequent waste; he is provided automatically every year with a cost valuation of all the live and dead stock, tillages, etc., on the farm. Briefly, cost accounts furnish the only reliable means by which a man can satisfy himself that losses in certain departments are not being incurred unsuspected because covered by the profit of other departments, and also the means by which to reduce costs by the better organization of production within departments, so as to turn unprofitable ones into paying enterprises and to make successful ones more successful still. The work published by several institutions on the cost of milk production is known to most people and may therefore be cited by way of illustration. Examination of the analyzed cost in many herds showed a remarkable variation between the best and the worst; in some cases bad results (*i.e.* high costs) were due to low milk yields, in others to expensive feeding, in others to faulty management of labour; but in every case the cause or causes of the poor results were only ascertained when all the costs of production were available for analysis and comparison."

973.—The Meat of Tuberculous Cattle From the Hygienic Standpoint.—SPARAPONI, G. C., in the *Annales d'Hygiene* Vol. XXXI, No. 2, pp. 125-131. Bibliography of 44 works. Rome, February, 1921.

The problem of the use of meat from tuberculous cattle in the ordinary way for human food has been much discussed and studied during the last fifty years, but the results obtained have been contradictory and differently interpreted. This is due to the fact that, owing to the lack of accurate methods for determining the presence of latent tubercle bacilli in the meat or organs of tuberculous cattle, there are no data upon which a correct judgment can be based. The author points out that the different results obtained by modern investigators as well as those of former times are attributable to the different anatomical type studied by them.

At the present day, the anatomical forms of tuberculosis which make the meat toxic

are well known, but such meat when cooked, becomes innocuous, and according to Nocard and Leclainche, "the consumption of meat which is even raw, or but little cooked, and contains some tubercle bacilli has certainly no bad effect upon man." Further there is no fear of toxic tubercular substances remaining in the cooked meat, since, as Galtier and Edelmann have shown, tuberculous beef contains only negligible quantities of such matters and these are very rapidly eliminated by the organisms of living cattle; this has been demonstrated by Fiorentini and Garino, who thus explain the fact that even serious tubercular lesions may exist where the state of nutrition of the affected animal is excellent.

Rumpel, and many other authors, have shown that the nutritive value of sterilized meat of tuberculous cattle is in no wise inferior to that of the flesh of healthy animals, so that the meat may safely be used for human food, for which purpose it is now very frequently sold in secret. The author therefore advises a radical change in the regulations of the present Italian health legislation dealing with the use of the meat of tuberculous cattle (art. III of the general Health Regulations, February 3, 1901).

CROPS AND CULTIVATION

977.—Weather Forecast and Agriculture.—GOLD, E., in *The Scottish Journal of Agriculture* Vol. IV, No. 3, pp. 254-258, 1 fig. Edinburgh, July, 1921.

Forecasts are now made in Great Britain in the following way:—Reports are collected several times a day from different places scattered over a wide area extending from Ireland to Madeira and from Spitzbergen to Cairo; a few reports are also received, almost daily, from some ship in the Atlantic to the West of Ireland.

The data transmitted give information respecting:—The height of the barometer; the way in which the barometer has been changing; the temperature; the direction and speed of the wind; the clearness and humidity of the air; clouds and their height; and a brief description of the weather at the time, and in the interval since the preceding report. By an ingenious utilization of figures, the whole information is telegraphed in 4 groups, each consisting of 5 figures.

The information thus received is entered upon charts or maps. These maps are compared with the maps immediately preceding them and with maps for the same season in previous years, to see what changes followed when the maps had the same characteristic features as those from which the forecasts are being prepared. Data showing the temperature and the direction of winds at great heights are also obtained, one from

aeroplanes, the other by the observation of small free balloons.

In forecasting the following principles are always kept in mind:—

(a) Weather travels, so that a region will usually experience the weather which is travelling towards it.

(b) Hills and mountains modify the weather by forcing the masses of air to rise to greater heights, where they may condense.

(c) Cold surface air tends to displace the layers of warm air beneath it, thus also producing condensation.

(d) Cold air moving over land or sea, where it becomes unduly warmed at the surface is set into vertical circulation, with the production of clouds and showers.

In 9 cases out of 10, it is possible to forecast with reasonable accuracy and confidence for a period of 24 hours ahead.

In addition to the information supplied to the Press, special telegrams are sent to any address on payment of the cost of the telegram and a small registration fee.

In this way regular forecasts are provided, notification of spells of fair weather are issued, and telegrams are sent indicating the progress of meteorological events, and warning when the spell is about to break. Frosts and storms are also notified.

The author makes some remarks on the organization of the Meteorological service abroad, specially in the United States where excellent results have been obtained, and expresses the hope that Great Britain will follow the good example set in America. He strongly advises the use of signals hoisted in some prominent position to announce the approach of frosts or of severe gales, or the setting in of fair weather.

885.—Influence of Periods of Drought on the Growth of Plants.—PFEIFFER, T., RIPPEL, A., and C. PFOTENHAUER, in *Die landwirtschaftlichen Versuchs-Stationen*, Vol. XCVI, Parts V and VI, pp. 353-363. Berlin, 1920.

Hellriegel, Wollny, Pfeiffer, with Blanck and Flugel, have already noted that intercalated waterings, when water is lacking, are harmful to the growth of plants, and even a large quantity of water after a period of drought is not sufficient to repair the injury which the plant has suffered so that, especially for spring crops, an average frequency of watering is much more suitable.

E. Gain has observed, however, that a certain quantity of water applied after a slight drought gives better results than permanent moisture even when optimum; the extreme case of injury caused by permanent moisture and a distinct advantage from interrupted waterings even occurred with the thorn-apple.

The authors have therefore considered it desirable to take up the question again by making pot experiments with lupins and spurrey as xerophilous plants, and with barley and oats as hydrophilous plants; these two last crops were, however, attacked by *Erisiphe graminis*. One series was kept at a constant humidity (60% of the capacity of water) by replacing every day the water evaporated; the other was left in suspense up to a certain degree of humidity (30% of the capacity of water), then a quantity of water equal to that which had been applied in the meantime to the first series in several waterings was applied during 26 periods. The yields in dry matter obtained were as follows:—

	Constant humidity	Alternate drought
	gm.	gm.
Lupins.....	35.0	24.5
Spurrey.....	28.1	21.1
Barley.....	14.6	14.4
Oats.....	32.4	28.0

The deductions from these results and from other observations is that, at least for the plants in the experiment, the greatest possible constant water content of the soil gives better results, or, at worst, not inferior results to those which are obtained by using the same quantity of water intermittently. A temporary dryness of the soil, not exceeding a certain limit, causes injury of various degrees to the growth of all plants, and the reason is found in their different aptitudes for adaptation to drought relatively to their greater or less power of reducing the consumption of water; spurrey and lupin, for example, require a long time to reduce the humidity of the soil from 60 to 30% of the capacity of water, and in the light of the experimental method adapted, these plants suffer more injury if they remain exposed for a long time to drought; barley comes next and lastly oats which make the greatest demands on the moisture in the soil.

The consumption of water per gram of dry matter produced is less with alternate periods of drought, and this is all the more noticeable with plants which adapt themselves better to the conditions of humidity of the moment, by regulating evaporation.

886.—The Carbon Dioxide of the Soil Air.—TURPIN, H. W., in *Cornell University Agricultural Experiment Station, Memoir 32*, pp. 319-362. Ithaca, N.Y., April 1920.

Carbonic acid has long been recognized as an important soil solvent, but from the data available, it is not yet clear what are the chief factors controlling the production of carbon dioxide in the soil; although it is

generally considered that a large proportion is due to the action of micro-organisms, the part played by plant-root excretions in this connection has not been determined. With a view to deciding this question, the author carried out a series of pot (the plants being grown in iron cylinders) and greenhouse experiments, a special arrangement for estimating the carbon dioxide being employed. The soil was a heavy clay loam rich in silt, and brought up to 30% moisture content on the oven-dry basis.

It was found by these experiments, that oats increased the production of carbon dioxide in the soil. This increase became marked after the first month from the time of sowing, and increased to a maximum just before or after the plants headed; then there was a gradual decline. Millet (*Setaria italica*), behaved in much the same manner, but the production of carbon dioxide by each plant was approximately half as great, and the most marked rise in the carbon-dioxide content of the soil occurred at a later period of growth than in the case of the oats. The cropped soil, after harvest, maintained a higher percentage of carbon-dioxide than was found in the uncropped soil. This was probably due to the decomposition of the plant roots left in the ground. The correlation existing between carbon-dioxide production and transpiration would seem to confirm the theory that increased plant growth is accompanied by more intense formation of carbon-dioxide. Fluctuations in the amount present in the uncropped soil were accompanied by similar fluctuations in cropped soil only after the removal of the crop and before the plants had made much growth. There appeared to be no definite connection between the soil temperature at the time of sampling and the carbon dioxide in the cultivated soil, or that assumed to be produced by the crop (determined by subtracting the carbon-dioxide in the bare soil from that in the cropped soil). In fact, the carbon-dioxide content of the former was usually high during warm weather, and low when the temperature decreased; further, very low atmospheric pressures were usually accompanied by an increase in the amount of carbon-dioxide in the uncultivated soil.

The carbon-dioxide produced presumably by the plants appeared to be independent of the initial carbon-dioxide content of the soil, which would seem to indicate that plants and soil organisms act independently in the production of this substance.

In conclusion: it may be assumed, that the plant itself and the micro-organisms present in the soil produce most of the carbon-dioxide. At the period of its most active growth, the plant produces much more carbon-dioxide than the soil organisms, and the excess carbonic acid in cropped soil is due to the respiratory activity of the

plants rather than to the decay of root particles, from the crop growing on the soil at the time of analysis.

983.—Analysis of Soils.—VESTERBERG, K.A. SVENSK KEM. (Tidskr. 1921, 33, 12-22) in *Journal of the Society of Chemical Industry*, Vol. XL, No. 11, p. 401-A. London, June 15, 1921.

The author questions statements to the effect that salts dissolved in the moisture in soils are absorbed by plants at the same ratio as the water itself; the roots do not take up the salts, etc., in the proportion in which they occur in the soil.

As regards the concentration of plant foods in soil moisture, which constitutes the minimum requirement of plants, the following quantities are suggested:

Phosphorous pentoxide, 1-2 mgm. per litre; nitrogen, 2-5 mgm. per litre; potassium, 10-20 mgm. per litre.

Climate would possibly have some effect on the efficiency of these amounts of foods.

Artificial Farmyard Manure.—HUTCHINSON, H. B., and RICHARDS, E. H., in *Journal of the Ministry of Agriculture*, Vol. 28, No. 5, pp. 398-411. London, August, 1921.

Experiments conducted at the Rothamsted Experimental Station to investigate the possibility of converting straw into manure without the intervention of live stock are reported.

From these experiments a method was devised by which straw can be converted into a substance having many of the properties of stable manure. In a considerable number of preliminary experiments to secure obvious breakdown and colour changes in fermenting straw, the most promising results were obtained when the straw was subjected to the action of a culture of aerobic cellulose-decomposing organisms (*Spirochaeta cytophaga*). Further inquiry developed that this effect was due mainly to the indirect effect of the mineral substances contained in the culture fluid.

It was found that the most essential factors making for the production of well rotted artificial barnyard manure are air supply, suitable temperature, and a suitable supply of soluble nitrogen compounds. It was established that characteristic breakdown changes in straw remain suspended when a free supply of air is excluded either by intense consolidation or by immersion of straw in liquid. The fermentation appeared, therefore, to be an essentially aerobic one, at least in its early stages, and the typical disintegration of the straw with the production of dark coloured plastic material did not take place in the absence of air. Also, the colour of aerobically produced manure was rapidly reduced when oxygen was excluded.

Repeated experiments showed that the most rapid breakdown of straw occurred when some source of available or indirectly available nitrogen was supplied, and then only in those cases where the reaction of the solution was neutral or slightly alkaline. Neither ammonium sulphate nor caustic soda were effective in this respect, since with the former the medium soon became markedly acid and with the latter the nitrogen was lacking. The addition of nitrogen in the form of urea, urine, ammonium carbonate, or peptone within certain concentrations immediately caused rapid decomposition changes, resulting in the production of dark coloured, well disintegrated, structureless material closely resembling well rotted manure.

It was brought out that it is of no less importance that the quantity of nitrogen added should not exceed a definite amount either actually or in concentration. If the concentration of ammonium carbonate produced from the decomposition of urine or urea exceeded a definite limit, straw breakdown changes were not only definitely held up but continued to be inoperative until by volatilization the concentration or alkalinity was reduced to the upper limit of growth of the micro-organisms. This is regarded as particularly important since the highest concentration for rapid breakdown was found to be appreciably below that of the weakest undiluted urine. In this connection it was found impossible to produce well rotted manure by the use of neat urine without considerable losses. Further experiments showed that, in addition to the two phases in which straw overloaded with nitrogen loses it to a definite degree and in which straw with the requisite amount of nitrogen may undergo rotting without appreciable loss, there exists a third phase in which undersaturated straw, by the agency of micro-organisms, exhibits a well marked property of picking up nitrogen, particularly in the form of ammonia, until the same final content of nitrogen in the rotted product is attained. It is therefore concluded that in two different but adjacent portions of fermenting straw, the one overloaded with and the other lacking nitrogen, the former portion loses and the latter accumulates nitrogen until a common level is approached.

In general it was found that when straw has worked from an unsaturated to a stable phase, little or no free ammonia is to be found, but that straw which commences with an excess of nitrogen appears to hold, when in a fermented state, upwards of 14 per cent of its nitrogen in the form of ammonia so long as the material is in a moist condition. Desiccation led to almost complete loss of ammonia.

It is concluded that the amount of nitrogen necessary for pronounced rotting and the

amount which straw is capable of fixing in the form of ammonia are identical, and that, in general the figure varies only between 0.7 and 0.75 parts of nitrogen per 100 parts of dry straw.

The experiments further showed that urea and ammonium carbonate are the most suitable carriers of nitrogen for this purpose, but owing to their cost alternative sources of nitrogen in the form of cyanamid and ammonium sulphate have been used with success. The latter, however, must be used with lime.

The Effect of Straw on the Biological Soil Processes.—MURRAY, T. J., in *Soil Science* Vol. 12, No. 3, pp. 233-259. Baltimore, March, 1921.

Studies conducted at the Washington Experiment Station to determine why the addition of straw to the soil causes a decrease in the subsequent crop yield are reported.

The addition of straw to the soil had a harmful effect on nitrate accumulation after a given time, which increased as the amount of straw increased. Total nitrogen determinations made throughout the work showed that where there was a loss in nitrate nitrogen it was transformed to some other form of nitrogen, and was not lost to the soil. As the amount of straw increased the loss of nitrates already in the soil increased. Straw acted as a source of energy for nitrogen-fixing bacteria, although the amount of nitrogen fixed was not dependent upon the amount of straw.

Ammonification was inhibited when the amount of straw present exceeded 0.9 per cent, and the harmful effect increased as the amount of straw increased. Straw had no effect on the kind of bacteria present in the soil. Cellulose from either filter paper or straw had no effect on the nitrate-forming bacteria.

The conclusion is drawn that straw applied to soil stimulates the reproduction of bacteria, and that the bacteria use the straw as a source of carbon and the soil nitrates as a source of nitrogen. The nitrates are transformed to organic nitrogenous material and are temporarily lost as available plant food, the intensity of the reaction apparently depending upon the amount of straw.

985.—The Influence of Fertilizers Upon the Productivity of the Soil.—JORDAN, W. H., Soil studies. I. The Influence of Fertilizers Upon the Productiveness of Several Types of Soil. II. The Influence of Fertilizers and Plant Growth Upon Soil Solubles, in *New York Agricultural Experiment Station, Bulletin 473*, 27 pp. Geneva, N.Y. March, 1920.

It was found, by growing barley under forcing-house conditions, on 9 different

types of soil consisting for the greater part of loams, the vegetative growth was influenced very little by the application of either litter or leaf-mould. During the first year's experiments, well-composted farm manure did not produce additional growth, although the results obtained with it the second year were satisfactory, but the plants to which commercial fertilizers were applied grew much more than those receiving stable manure, the quantities of nitrogen, phosphoric acid and potash being the same in the two cases. Slaked lime applied with farm manure had a very irregular effect according to the different types of soil, in short, nitrogen appeared to be the sole fertilizing substance having a marked influence upon barley.

To confirm these results, two soils were selected, one highly productive, and the other less fertile, and barley again planted. It was found that, under forcing-house conditions, the soils appeared to supply sufficient quantities of phosphorus and potassium for luxuriant vegetation.

The application to the soil of soluble compounds of nitrogen, phosphorus and potassium, materially increased the proportion of water solubles in the soil; these were used by the plants, and their amount was thus rapidly reduced before the barley had attained considerable growth. In the latter stages of its development, the quantity of the water-solubles remained constant and was much the same (with the exception of the phosphorus) as that present in the soil receiving no fertilizer.

To sum up: it would seem that from the practical standpoint, the above data show the importance of the solubility of the three essential ingredients of fertilizers, especially in the production of quickly growing crops. Plants accumulate a large proportion of the required nitrogen and ash ingredients during the early stages of growth, for which reason, in the case of forcing-house culture, vegetable-gardening, and of such crops as cabbages, potatoes and wheat, an adequate supply of immediately available food appears to be indispensable in order to obtain good results.

891.—The Mechanism of the Decomposition of Cyanamide in the Soil.—COWIE, G. A., in *The Journal of Agricultural Science*, Vol. X, Pt. 2, pp. 163-176. Bibliography of ten works. Cambridge May, 1920.

In a preceding investigation the author showed that cyanamide readily breaks down, yielding ammonia in normal clay and sandy soils. The experiments here discussed confirm the view held by Ulpiani as a result of his later work, namely that cyanamide breaks down by a purely chemical change to urea which is then converted into ammonia.

In the experiments carried out by Ulpiani, culture solutions of various concentrations

and at various temperatures were employed, whereas the author conducted his experiments in soil under natural conditions, using amounts of cyanamide comparable with those used in practice. No appreciable amount of ammonia as a result of the decomposition of cyanamide in sterile soils was evident (heated to 120° or 135°C.). The addition of the urease of soya-bean, however, produced considerable quantities of ammonia in these soils which indicated the presence of urea, later confirmed in the laboratory. Further experiments demonstrated that urea actually remains stable in soils heated to 120°C. The addition of cyanamide to sterile soils thus leads to an accumulation of urea, which persists as such in consequence of the suppression of the necessary urea decomposing organisms. Similarly the addition of cyanamide to soils heated to 100°C. does not lead to immediate production of ammonia but yields urea, which decomposes after the recovery of the appropriate organisms. There is on the other hand, evidence of a rapid and progressive production of ammonia arising from the decomposition of cyanamide in unheated normal clay and sandy soils. However, examination of these soils revealed in the initial periods the presence of appreciable amounts of urea.

The cumulative evidence thus leads to the conclusion that cyanamide in the soil is normally converted by a purely chemical process into urea and independently of the activity of micro-organisms. The urea is then broken down into ammonia by means of soil organisms. Cyanamide appears to behave in this way in both clay and sandy soils, but the decomposition seems to be more rapid in the former case. The experiments have conclusively shown that cyanamide does not decompose into urea in ordinary impure quartz sand; whatever the decomposing agent may be it is not present in pure sand. In one special case sand has been shown to contain a constituent resembling a zeolite. In any case cyanamide does not appear to decompose in the manner above indicated in peat and fen soils; in these it gives rise to a relatively small production of urea under normal conditions.

996.—Potato Improvement by Hill Selection in U.S.A.—STEWART, G., in *Utah Agricultural College Experiment Station, Bulletin* No. 176, pp. 3-28, figs. 14. Logan, Utah, Nov. 1920.

In 1911, a number of the highest and also of the lowest yielding hills were selected and isolated from the Majestic, Bangor and Peerless varieties, then being grown at the Utah Experiment Station. In 1912, the tubers from each hill were cut into sets weighing approximately 2 or 3 oz. and

containing on the average 2 eyes. The sets were planted about 15 in. apart with rows 3 ft. apart. At harvest time each hill was dug separately and the tubers isolated and later weighed, etc. About half of the best hills from the best progeny-rows and a few high yielding hills from other good rows were chosen. In poor selections, the lowest-yielding hills were used for seed. This method of selection was continued from 1912 to 1919, and is being continued still further and supplemented. Except that the poor selections were discarded in 1916, and after 1914, Bangor and Peerless stocks were also discarded on account of inferiority in yield.

The experiment was so conducted as to avoid selection for somatic characters and to secure selections for gametic qualities. This was done by growing all the best strains for 2 or more years in order to get a progeny test of the power of a strain to transmit its desirable qualities to the succeeding generations.

By 1915 the high yielding strains yielded an average of 301.03 bus. per acre as compared with 179.30 bus. per acre for unselected. From 1915 to 1920 the selected strains had outdistanced the unselected stock of the same variety by more than 100 bus. per acre, except for 1919 where there was a difference of only 29.6 bus.; (this wide fluctuation may have been due to the extremely unfavourable growing season of 1919). In 1920, however, the superiority of the selected strains manifested itself, outyielding the unselected strains by 168.6 bus.

Taking the 6-year average 1915-1920, the acre yield of the selected strain was 60.9% greater than that of the unselected, and the average size of tuber 24.4% greater.

The germination of the selected strain is more rapid, the stand is better, the growth thriftier, and diseases less apparent than for the unselected potatoes of the same variety.

A degenerate strain of highly chlorotic foliage has been isolated, but this could not be traced to any disease.

905.—Treatment of Potato Sets and Arguments for and against Cutting and Planting Whole.—I. COOLEY, E. W., To Cut or Not to Cut Seed Potatoes, in *The Potato Magazine*, Vol. 3, No. 11, pp. 8-9, Mount Morris, Illinois, May, 1921.—SCHRIBAUX, E., Experiences a entreprendre sur la fragmentation des plants de pomme de terre, in *Comptes rendus des Seances de l'Academie d'Agriculture de France*, Vol. 7, No. 4, Paris, Jan. 26, 1921.—III. TAYLOR, W. H., Treatment of Potato Sets in New Zealand in *The New Zealand Journal of Agriculture*, Vol. XXII, No. 4, pp. 227-228, Wellington, April 20, 1921.—IV. TICE, C., The Potato in British

Columbia Whole versus Cut Seed in *Department of Agriculture, Soils and Crops Division, Province of British Columbia*, Bulletin No. 86, pp. 24-27. Victoria, B.C., 1921.

Some growers declare that seed potatoes should be cut lengthways so that each piece will contain a part of the seed end of the potato, confident in the fact that the seed end sprouts sooner than the stem end or any other part of the potato and that the sprouts will be stronger and the yield larger. Others assert that the seed end should be cut off and thrown away as they consider that instead of sending out one or more strong vigorous shoots, the seed end will produce a number of small, weak ones. Then again, some of the most successful potato growers plant nothing but the whole potatoes. Experiments made in various countries are therefore well worth consideration in order to come to some more definite conclusion as to the best method to adopt.

I.—In the United States as a result of observation and experiments conducted in Maryland, Michigan, Colorado, etc., it was concluded that most of the eyes on a potato have equal value for seed purposes, and at Michigan Agricultural College Farm it was demonstrated that the stem end piece bore as vigorous sprouts when separated from the seed ends as the seed ends themselves, and when all other conditions were equal, the individual hill yields were also approximately the same. While it is true that the size of the seed piece is more important than the number of eyes, the experiments seemed to indicate that each seed piece should contain at least two eyes.

A number of seed potatoes from high yielding hills were cut so as to give pieces of approximately the same weight but with varying numbers of eyes. Twenty-one pieces containing 1 eye per piece showed 61% germination; 4 pieces with 1½ eyes per piece showed 75%; 20 pieces with 2 eyes per piece, 4 with 2½ eyes per piece and 7 with 3 eyes per piece, showed 100% germination. The average quantity of cut potatoes used amounted to 10 bushels per acre, but experiments conducted on 360 farms in the State of New York showed that the yield was from 85 to 100 bushels more per acre when 18 bushels of seed were planted than when 10 bushels were used.

II.—M. Scribaux draws attention to the evident disadvantages connected with cutting sets, and then proceeds to indicate the advisable methods to adopt in order to compare the growth and yield to be obtained from cutting or planting whole, in consideration of the fact that at the Academie d'Agriculture d'Angers, information has been received recommending the cutting method

both from the economical standpoint and as regards yield.

As regards the disadvantages, emphasis is laid on the fact that certain varieties (e.g. Richters' Imperator) when cut, are liable to rot. This is, however, an exception, and there is no reason to exaggerate the physiological dangers attached to cutting which can to a large extent be lessened and even eliminated. Care should be taken to plant only sets which have been exposed to the air for several days. Secondly, extra labour is involved in the cutting process. There is also a risk of waste through drying which applies also to the period following planting,

as cut sets are less resistant to drought, defective cultural operations, etc., than whole sets. Even under favourable conditions, success is at present uncertain and the author considers that this is due to the lack of knowledge concerning (a) the advisable average weight of the cut sets; (b) the best system of planting to employ.

The author suggests the following plan but considers that unless the greatest care is taken to observe the details, it should not be attempted, seeing that it is the relative and not the absolute yield which it is desired to determine.

Whole sets		Cut sets					
Distance apart	Number of plants per square yard	SMALL About 0.35 oz. Each with 2 eyes		MEDIUM About 0.7 oz.		LARGE About 1 oz.	
		Distance apart	Number of plants per square yard	Distance apart	Number of plants per square yard	Distance apart	Number of plants per square yard
inches		inches		inches		inches	
20 x 16	5	20 x 6	14	20 x 8	10	20 x 10	8
20 x 20	4	20 x 7	12	20 x 12	7	20 x 13	6
20 x 24	3	20 x 10	8	20 x 16	5	20 x 20	4

The cutting of small sets above recommended is the method adopted with success by M. Maisonneuve at Angers, who after having removed a third of the tuber where there are few eyes, cuts the remainder into 6 or 8 parts according to the number of the eyes. As regards the large sets M. Schribaux recommends a similar removal of the lower inferior part of the tuber and cutting vertically the remainder into equal parts.

With reference to planting, the author remarks that the cut sets should be planted less deeply than the whole sets; about 1.2 to 1.6 inches deep for the small, 1.6 to 2 inches for the medium, and 2 to 2.4 inches for the large.

At harvest time, note should be made of the failures, the average number of shoots per plant, the yield per plot and per clump, the average weight of tuber and the proportion of large, medium and small. During these experiments, it is particularly important to note carefully all circumstances which tend to influence the quality of the yield in one way or another.

III.—In New Zealand it has been proved by growers that potatoes may be roughly divided into two classes, viz., round varieties on which the eyes are nearly all active at the same time, and kidney shaped (occasional rounds) that have a decided rounded end. If the former be planted with all the buds intact, a large proportion of them will grow into shoots. The latter behave differently. One, two or three buds start before the

others, and if nothing happens to destroy them they will produce a plant. The remaining eyes will remain dormant. If the tops of these shoots are injured by frost, they make fresh growth lower down. This naturally results in a reduction in the crop, but the latter may still be profitable. A second frost may occur which will entirely destroy the first tops. Other buds, that probably have already broken but not made much headway, then break through and may produce a crop just sufficient to pay costs. This explains why no disbudding is done. The seed tubers are not cut as that would cause delay, and the second set of buds would not be able to continue growth.

The common belief that all the eyes on a set will produce shoots, and that disbudding is necessary to prevent an overplus of shoots which would give small potatoes is, therefore, contradicted.

IV.—Experiments conducted in British Columbia support the claim made by M. Schribaux that in districts where the land is wet or poorly drained, whole potatoes are preferable to cut sets, since the latter rot easily. Also cut sets are more subject to disease, and sprout later. However, the percentage of marketable potatoes has been found in this case to be smaller when whole sets are planted than with cut sets.

When cut sets are used, a 2-oz. piece has been usually found the best. This statement is fully borne out in an experiment carried out by Dr. Zavitz at Guelph. Sets were

planted for 5 years weighing 1-16 oz., 1-8 oz., $\frac{1}{4}$ oz., 1 oz., and 2 oz.; one eye was left in a piece and the pieces planted 1 ft. apart in the rows. There was a variation in yield from 47.5 bushels to 173.9 bushels for 2 oz. of seed. Subtracting the amount of seed used, the former gave 46.2 bushels and the latter 132.7 bushels. The system of cutting out the eyes of the set is not recommended as the author considers there is not enough plant food present to support the young shoot till it develops a root. The system of two eyes to a set is usually conceded as giving better results than even 1 or 3 eyes. Where a large number of eyes are present the percentage of marketable tubers is greatly reduced; this was found especially true when the seed-end of the potato was planted although the potatoes thus obtained were earlier.

LIVE STOCK AND BREEDING

931.—Correlation Between the Size and the Digestibility of a Ration.—HONCAMP, F., and KOCH, E., in *Die Landwirtschaftlichen Versuchstationen*, Vol. 96, Nos. 1 and 2, pp. 45-120. Berlin, March, 1920.

Henneberg, Stohmann and Wolff had already doubted the existence of any important influence exerted by the size of a hay ration upon the digestibility coefficient. Kellner, on the other hand, having fed a mixture of roughage and concentrates to oxen, observed that the digestibility of the ration decreased as the quantity increased.

Experiments carried out in America, by Jordan and Hall on cows and sheep, gave contradictory results, whereas Katayama and also Schneidewand observed that pigs digested best the protein contained in the smallest ration.

As the results hitherto obtained were at variance, on June 1, 1914, the authors began a series of experiments on sheep, to determine the possible correlation existing between the size and digestibility of a ration, when the fodder was the same, both in the case of a ration composed wholly of bulky fodder, and in that of one containing roughage as well as concentrates.

In the first series of experiments, which was divided into 4 experimental periods of 10 days separated by intervals of 8 days, 3 sheep were fed a daily ration of 600, 900, 1,200 and 600 gm. respectively, of the same clover hay: the author obtained for the 2 animals and the different sized rations, average variations not exceeding the usual limit of experimental error, except in the case of crude cellulose, of which the digestibility coefficient in the largest ration was 6.6% lower than that of the smallest.

In a second series of experiments carried out under the same conditions as the preceding,

but with a ration composed of clover-hay, gluten, soya-flour, potato-slices mixed with molasses and potato-flakes the digestibility coefficient of the largest ration differed from that of the smallest in the following degrees:—2.7% total organic matter; 2.2% protein; 1.7% nitrogen-free extract; 6.5% pentosan; 7.6% crude fibre; and +8.6% ether extract (crude fats), the only positive difference.

In another series of experiments with 2 young sheep, the rations fed consisted of clover hay, dry potatoes, rice and gluten, and only differed from the preceding ration in containing a larger proportion of carbohydrates, especially of the soluble varieties. With this ration, the reduction of digestibility was greater than in the second series of experiments.

The authors do not think that the variations in the digestibility of the albumen can depend upon the differences in the intensity of intestinal decomposition, seeing that, in the experiment, the difference between ingested and evacuated matter was allowed for. Nevertheless, they have carefully observed the organic exchanges of nitrogen and sulphur under their various forms, taking as a basis the view of Abderhalden. According to the latter, it would seem probable that under normal conditions all the esters combined with the sulphuric acid of the urine (phenol, indoxyl, skatoyxl) are derived from intestinal putrefaction, an opinion that is not shared by Emden, Glaessner and Folin.

The authors conclude by stating that: (1) In the main, their researches on the secretion and decomposition of the sulphur compounds present in the urine of the herbivora have not given the desired and expected results; (2) the results of these researches in no wise warrant the assumption that there is any correlation between the small depression of the albumen resulting from the increase in the ration, and a diminution of the decomposition of albuminoids in the intestine; (3) if the quantity of sulphuric esters in the urine were alone taken into consideration, an increase, rather than a decrease, in the decomposition would be observed as a result of the larger ration.

In fact, the increase in the ration produces a decrease in the solubility and digestibility of the crude fibre in the intestine, partly on account of the short time the unit weight of the food mass remains in the intestine (which also has the greatest effect when the ration consists exclusively of roughage), and partly because, if a ration is composed of a mixture with a high content of easily-soluble carbohydrates, the latter are first attacked by the bacteria of the intestine, and are rendered soluble and digestible, whereas the fibre is not touched; this depresses the digestibility of the crude cellulose forming the cell wall and hence of that of

the albumen of the carbohydrate substances, etc., present within the wall.

In other experiments made upon 4 young sheep fed with a mixture of ordinary fodder in proportions varying in such a manner as to give rations differing as regards the amount of Kellner's starch equivalents, the protein alone showed any practical difference in digestibility in the ration containing least starch equivalent.

The authors conclude that although it is true that an increase in a ration reduces its digestibility, yet it does so to such a slight extent as to be negligible in comparison with the larger errors made in calculating rations based on the mean value of the composition and digestibility of the fodders given.

AGRICULTURAL INDUSTRIES

952.—Nitrogen and Other Losses During the Ensiling of Maize.—SHAW, R. H., WRIGHT, P. A., and DEYSHER, E. F., in *United States Department of Agriculture Bulletin No. 953*, pp. 1-16, bibliography of 19 works. Washington, D.C., May 14, 1921.

For several years the Dairy Division of the United States Department of Agriculture has been studying to find out more definitely what losses incident to the ensiling of maize are necessary, and what is the proper method of handling the crop to prevent such losses. This bulletin deals with the losses of nitrogen and other elements in maize silage made under ordinary farm conditions.

A cylindrical concrete silo was employed 42 ft. high x 14 ft. inside diameter, holding approximately 150 tons, and located at the Dairy Division Experiment Farm, Beltsville, Md. The floor was 4 ft. below the lowest door and the silo up to this door was water tight. The experimental work was carried on for 2 seasons, 1914-15, 1915-16. The depth of the silage after settling was approximately 38 ft.

The weight and chemical composition were recorded of: (1) the maize in each sack as it was buried; (2) the contents of the sacks as they were moved from the silo; (3) the juice. The losses or gains in each sack were estimated, based on the weights ensiled.

The results of the chemical analyses as given in the Tables, show many evidences of a down-wash of soluble material, the upper part of the silo losing and the lower part gaining. The greatest loss of dry matter in any bag in 1914-15 was only 18.64%, while the average loss for all the bags was 8.66%. The bags in the upper and lower halves of the silo showed respectively, 12.74% and 4.70% losses in dry matter. The apparent reversal of results in the following season may be attributed to the much larger outflow of juice. The average loss for all bags, however, from the 2 years' work, may

be taken as nearly 10% of the dry matter, which is probably due to a large extent to the fermentation of the carbohydrates and to the carrying away of a soluble material by the juice. The reducing and non-reducing sugars almost entirely disappeared. There was a considerable loss in crude fibre and in the furfural yielding bodies.

The evident loss in total nitrogen may be due largely, if not entirely, to the nitrogenous compounds which escaped in the juice. The albuminoid nitrogen suffered a loss of over 50%, while the non-albuminoid forms increased several times their own weight.

If the total nitrogen of the 2,579 lb. of juice collected in the first season is expressed as pure protein, the loss was 28.89 lbs. which represents the protein in about 1,500 lb. of average silage. In the second season, the results expressed in a similar way, show a loss of 150.75 lbs. in the 9,494.5 lb. of juice collected, representing the protein in about 7,500 lb. of average silage.

There was a gain in ether extract, which is probably due to the formation of new ether-soluble bodies.

The juice which was collected the second season amounted to nearly 10,000 lb. This juice averaged 0.263% total nitrogen, 0.0283% albuminoid nitrogen, 317.9 parts ammonia nitrogen and 1,472.9 parts amino-nitrogen per million.

1047.—Utilization of the Potato as Stock Feed, Source of Alcohol, etc., Manufacture of Dehydrated and Dried Pressed Potatoes, Flour and Starch.—GORE, H. C., in *State of New Jersey, Department of Agriculture, Bulletin No. 28*. Trenton, N.J., March, 1921.

The necessity of providing some outlet for surplus potatoes during exceptionally favourable seasons, has led to the utilization of potatoes for various purposes. The author here reports the progress made in the United States in this respect:—

Stock Feed.—One of the difficulties of profitable feeding of potatoes is the necessity of providing an adequate supply of sound stock throughout a long period. It now seems probable, however, that this difficulty can be overcome by the practice of ensiling; potato silage is eaten freely by cattle and can be used also for pigs; it appears to be as palatable as the best maize silage.

An experiment was made at the Dairy Farm at Beltsville comparing the gain in weight of 6 cows, 3 fed with potato silage and 3 with maize silage for 30 days, at the end of which time the rations were reversed, allowing 10 days to make the changes and extending the length of the experiment another 30 days. The following table shows the milk and fat produced, feed consumed and the gains in weight.

THE AGRICULTURAL GAZETTE OF CANADA

Manufacture of Dehydrated Potatoes.—There is at present no wide market for dehydrated potatoes (dried) although during the war the use was considerable.

Manufacture of Dried Pressed Potatoes.—The equipment needed for converting the potatoes into dry feed is easily constructed; the washing is done in a continuous paddle machine of the type used in washing potatoes

for starch making. From the washer the potatoes are ground until liquified and passed into a stock box, provided with a gate valve, and then passed into the hydraulic press as needed. About one ton of ground potato is pressed at one time, the process taking from 15 to 20 minutes. The yield of dried pressed potato is about 20% of the weight of potatoes.

	Produce		Feed consumed				Gain in weight
	Milk	Fat	Grain	Hay	Potato	Maize silage	
	lb.	lb.	lb.	lb.	lb.	lb.	lb.
Maize silage groups—							
First 30 days.....	1,719.3	79.95	780	540	.....	2,700	60
Second 30 days.....	1,611.5	83.62	810	540	.....	3,000	78
Total.....	3,330.8	163.57	1,590	1,080	.....	5,700	138
Potato silage groups—							
First 30 days.....	1,546.0	77.64	808	540	3,000	.....	86
Second 30 days.....	1,732.2	80.09	780	540	2,700	.....	71
Total.....	3,269.2	157.73	1,588	1,080	5,700	.....	157

Manufacture of Alcohol.—This work carried on under the direction of Wiley (Bureau of Chemistry, U.S.), started in 1910, permits the following estimates to be made as to the cost of alcohol manufacture in small plants: Approximately 0.66 gall. of 180 proof alcohol can be produced from 1 bushel of potatoes of 14% starch content. The potatoes used daily will weigh about 8,000 lbs. to obtain 100 gall. per day; and this necessitates the mashing of 320 lbs. of malt.

A summary of the cost per gall. of alcohol (180 proof) is given as follows (in dollars): Raw material 0.279, investment 0.124, operating 0.159. Total \$0.562.

There will be about 1,000 gall. of spent mash worth \$0.04 per bus. of original potatoes, or \$5.33 or 0.053 per gall. of alcohol produced; this makes on an average the net cost per gall. \$0.509.

This may be compared with the cost of manufacturing alcohol from potatoes in a plant of German manufacture, in which alcohol of 180 proof is produced at the rate of 263 gall. per day, and the total cost amounts to \$0.478 (i.e. the net cost per gall. \$0.425).

Owing to present conditions these figures would now be considerably increased, and whether or not the production cost can be decreased still remains an open question for further experimentation.

Potato flour.—The most important process developed is a steam drying method in which the potatoes are converted into potato flakes which are later milled into flour.

The raw potatoes are washed in a machine commonly used in distilleries or starch factories and then conveyed by an elevator

to a steamer erected over the drying apparatus, where they are cooked by means of low pressure steam. After steaming, the potatoes are allowed to fall by gravity into hoppers and through the emasculators, where they are reduced to pulp, and in this shape are forced on to the drying drum. These drums turn in opposite directions at 5 revolutions per minute. The heat dries off the moisture of the pulp and leaves a firm mass that is scraped off by means of knives set parallel to the main axes of the drums. The dried mass falls into a spiral transformer fitted with revolving arms where it is broken into flakes and conveyed to the packing room. Numerous factories are now established in various American States, and the capacity of a single unit plant is about 8,000 lb. per day. The flour is used principally to improve the quality of bread, but has other baking uses. There is, however, still much to be done in developing this industry. The price at present is about 9 cents per lb. in wholesale quantities. The author considers that this flour does not possess the same glutinous qualities as rye and wheat flour, but has peculiar properties as yeast food and a good flavour.

Potato starch.—This is more extensively manufactured than any other potato product. All grades of potatoes have been found to yield starch of good quality. The author describes the methods employed in the American factories including the processes of washing, grinding, sieving, settling and washing the starch, the treatment of "brown starch" (soft layer of sticky brownish sludge 2 to 6 inches in thickness, consisting of fine particles of cell-wall tissue from the

potatoes and other impurities and a certain quantity of starch), and finally, the drying and bagging. The average capacity of the starch factory with its dryer is 4 tons of dry starch per day.

The author considers the "Jones" factory at Caribon, Maine, as an example of the best type of the more modern Maine potato starch factories. It differs from the earlier types in the arrangement and operation of the settling and washing tanks.

As regards the value of potato starch compared with other starches, the author states that it is more valuable than maize and cassava starch, but somewhat inferior to wheat starch. The actual starch content amounts on an average to 15%.

It has, however, value in the finishing and weaving of textiles which no other product possesses, especially fine grade cotton goods. It is also the source of the best grade of white dextrin used in making finer grades of library paste.

1050.—Pasteurization of Milk in Bottles and Jars.—KUFFERATH, H., in the *Annales de Gembloux*, Year XXVII, Part 6, pp. 196-202. Brussels, June, 1921.

In the course of tests carried out at the Intercommunal Laboratory at Brussels for the purpose of controlling the milk supplied by the Intercommunal Dairies, it was found quite impossible to pasteurize milk completely with the usual type of continual pasteurizers (the "holding process"), under normal industrial conditions, and further that from the hygienic standpoint, the results obtained were disastrous. Thus, from 1915 to 1918, 22 samples out of 29 examined were declared to be bad, and not

to answer to the description of pasteurized milk; only 4 samples were good, and 3 were fair. On an average these milks contained 349,379 bacteria per cc. and in 10 cases (or 34.4%), coli bacilli were discovered. Until the end of 1919, out of 7 samples of pasteurized milk 1 would be found satisfactory and 6 unsatisfactory; 4 times coli bacilli were present, and the average number of micro-organisms was 910,693.

On testing the milk on the market, this was also proved to be insufficiently pasteurized.

Subsequently, the author together with M. Bock, carried out some pasteurization experiments at the Boitsfort dairy. They used simplified apparatus consisting of a steam generator, and a small metal boiler heated over an open fire; the steam was conducted by a tube to the pasteurizers, properly so-called, which were placed in another room. These consisted of simple vessels of galvanized iron with an internal diameter of about 1 metre, and a depth of 70 cm., having at the bottom, an opening for the admission of the steam, and also a waste-pipe. The experimental data that follow refer to the heating of milk in bottles and jars.

It was found that in order for the pasteurizing process to be carried out satisfactorily, heating, when bottles are used, must be continued from $1\frac{1}{2}$ to $1\frac{3}{4}$ hours, counting from the first admission of the steam to the end of pasteurization. With jars, 50 to 60 minutes is reckoned to be sufficient. The 19 samples examined all proved satisfactory, the average number of micro-organisms being 472 per cc. In no case were coli bacilli present; the only micro-organisms discovered being spore-forming bacteria.

OTHER ARTICLES ON SCIENCE AND PRACTICE OF AGRICULTURE

On account of lack of space the following articles in the International Review of the Science and Practice of Agriculture can only be referred to. Anyone desiring the articles may obtain them from the Institute Branch, Department of Agriculture, Ottawa.

890.—The World's Synthetic Nitrogenous Fertilizer-Industry.—I. WABSER, B., Fortschritte der anorganischen Grossindustrie während des Weltkrieges: Stickstoff und seine Verbindungen, in *Chemiker Zeitung*, Year 44, Nos. 102, 105, 108, 110, 116, 122, 124, 127, 128, 129, 130, 134, 135. Bibliography of 589 publications. Gothen, Aug.-Nov., 1920.—II. MEINGAST, R., Die Fortschritte der elektrochemischen Industrie in den Jahren 1916-1919, *Ibid.*, Nos. 150 and 153. Bibliography of 124 publications, Dec., 1920.—III. WICHERN, G.,

Bericht über die Fortschritte der Düngemittelindustrie in den Jahren 1913-1920. *Ibid.*, Nos. 10 and 16. Bibliography of 141 publications, Jan.-Feb., 1921.—IV. ESCARD, J., Utilization industrielle de la cyanamide, in *Le phosphate et les engrais chimiques*, Year 30, pp. 110-112. Paris, April, 1921 (12 pages in Institute Bulletin).

894.—Factors Influencing the Assimilation of Fertilizing Matter by the Plant.—WRANGEL, M., in *Die Landwirtschaftlichen Versuch-Stationen*, Vol. XCVI, Pts. 5 and 6, pp. 209-262. Berlin, 1920.

897.—Inheritance of Length of Internode in the Rachis of Barley.—HAYES, H. K., and HARRY, H. V., in *United States Department of Agriculture*, Bulletin No. 869, pp. 1-26. Washington, September, 1920.

- 898.—Observations and Researches on the Sugar Beet.—MUNERATI, O., in the *Memorie delle Reale Accademia dei Lincei*, Series V, Vol. XIII, Part V, pp. 175-322. 274 bibliographic quotations (Bibliography up to the end of 1919). Rome, 1920.
- 926.—An Attempt to Induce the Hereditary Transmission of Dourine.—NATTAN-LARRIER, in the *Bulletin de la Societe de Pathologie Exotique*, Meeting of May 11, 1921. Vol. XIV, No. 5, pp. 273-277. Paris, May, 1921.
- 936.—Experiments Made in the United States on the Value of Cottonseed Meal as a Partial Substitute for Grain in a Ration for Horses.—BELL, G. A., and WILLIAMS, J. O., in *United States Department of Agriculture, Bulletin* No. 929, pp. 1-10. Washington, D.C., Dec. 17, 1920.
- 944.—The Spring International Exhibition of Motorculture, Paris, February 10-20, 1921.—I. BONNAMAUX, H., in *La vie au champs*, Ser. 3, No. 11, pp. 6-9. Paris, Jan. 25, 1921.—II. *Bulletin de la Chambre Syndicale de Moto-culture de France*, No. 8, pp. 4-5. Paris, Jan.-March, 1921.—III. DIFFLOTH, P., in *La vie agricole et rurale*, Year 10, Vol. XVIII, No. 15, pp. 229-234. Paris, April 9, 1921.
- A High School of Rural Household Economy in Belgium.—DE VUYST, JEANNE, in *International Review of the Science and Practice of Agriculture*, pp. 1217-1220. Rome, October, 1921.
- Motorculture in Spain.—BENLLOCH, MIGUEL, in *International Review of the Science and Practice of Agriculture*, pp. 1220-1224. Rome, Italy, October 1922.
- 972.—The Danger of Using Hydrocyanic Acid for Disinfecting Flour.—MARCHADIER, GOUJON, and DE LAROCHE, in the *Journal de Pharmacie et de Chimie*, Year 113, Series 7, Vol. XXIII, No. 10, pp. 417-420. Paris, May 16, 1921.
- 974.—Experiments Made in the United States Concerning the Practical Application of X-Ray Radiation in the Destruction of *Trichinella Spiralis* in Infested Meat.—SCHWARTZ, B., in *Journal of Agricultural Research*, Vol. XX, No. 11, pp. 845-854. Washington, March, 1921.
- 979.—Weather Bureau Activities in California as Applied to the Production of Sugar Beets, Citrus Fruits, Dates and Rice.—PALMER, H.A., in *Monthly Weather Review*, Vol. 49, No. 4, pp. 219-223. Washington, April, 1921.
- 989.—The Importance of Magnesium Sulphate as a Fertilizer.—JACOB, A., in the *Chemiker Zeitung*, Year XIV, No. 56, pp. 445-447. Cothen, May 10, 1921.
- 992.—Character and Productivity of Stalrag, a New Kind of Rye Obtained at Svalof by Selection from the Stjernrag.—LJUNG, W. E., in *Sveriges Utsadeforenings Tidskrift*, Year XXXI, No. 3, pp. 95-101. Malmö, 1921.
- 993.—Experiments in Crossing Different Species of Barley in the United States.—MALLOCH, A. S., in *The American Naturalist*, Vol. LV, No. 638, pp. 281-286. Lancaster, Pa., May-June, 1921.
- 999.—Observations on the Wheats of Libia.—SCAETTA, H., in the *Giornale di Agricoltura della Domenica*, Vol. XXXI, No. 30, p. 235. Piacenza, July 24, 1921.
- 1000.—Trials of Strampelli Wheats in Italy.—JOSA, G., in *l'Italia Agricola*, Year 58, No. 6, pp. 163-171. Piacenza, June 15, 1921.
- 1001.—Topping of Wheat.—SUCCI, A., in *l'Italia agricola*, Vol. 58, No. 7, pp. 197-204. Piacenza, July 15, 1921.
- 1025.—Determination of the Amount of Assimilation Energy Necessary for the Production of Meat and Fat in Young Pigs; Experiments in Germany.—WELLMANN, O., in the *Deutsche Landwirtschaftliche Presse*, Year XLVIII, No. 43, pp. 325-326. Berlin, June 1, 1921.
- 1028.—Notes on the Inheritance of Colour and Markings in Pedigree Hereford Cattle in England.—PITT, F., in *Journal of Genetics*, Vol. IX, No. 3, pp. 281-302. Bibliography of 12 works.
- 1031.—Study of the Cattle-Breeding Situation in South America (Brazil, Uruguay, (Argentina) Especially as Regards a Possible Market for Swiss Cattle.—LUTHY, G., in the *Annuaire Agricole de la Suisse*, Year XXII, vol. 2, pp. 49-70. Lucerne, 1921.
- 1034.—Experiments Made in the United States on the Respective Values of Green Feeds as a Preventive of Intestinal Disorders of Growing Chickens.—PHILLIPS, A. G., CARR, R. H., KENNARD, D. C., in *Journal of Agricultural Research*, Vol. XX, No. 11, pp. 869-873. Washington, D.C., March, 1921.
- 1048.—Experiments in Drying Green Peas.—MESSINA, M., in the *Revista di Agricoltura*, Vol. XXVI, No. 27, pp. 384-386; No. 28, pp. 396-398. Parma, July 8 and 15, 1921.

THE AGRICULTURAL GAZETTE OF CANADA

- 1051.—**Storage of Vegetables.**—DIFFLOTH, P., in *La Vie Agricole et Rurale*, Year 10, Vol. XVIII, No. 19, pp. 293-297. Bibliography of 4 works. Paris, May 7, 1921.
- 1053.—**Storing Sweet Potatoes in Trinidad.**—BRUNTON, L. A., in *Bulletin of Department of Agriculture, Trinidad and Tobago*, Vol. XIX, Pt. 2, pp. 88. Port of Spain, 1921.
- 1070.—**Leafy Spurge (Tithymalus Esula Euphorbia Esula) Harmful Weed in the United States.**—BRITTON, N. L., in *Journal of the New York Botanical Garden*, Vol. XXII, No. 256, pp. 73-75. Lancaster, Pa., April, 1921.
- 1072.—**On the Resistance of the Adult Cockchafer to High and Low Temperatures.**—FAES, H., and STAEHELIN, M., in the *Comptes rendus hebdomadaires des Seances de l'Academie des Sciences*, Vol. CLXXII, No. 1, pp. 61-64. Paris, 1921.
- 1074.—**The Introduction Into Southern France of the Australian Coccinellid, *Cryptolaemus Montrouzieri*, a Natural Enemy of Scale Insects (*Pseudococcus*).**—MARCHAL, P., in the *Comptes rendus hebdomadaires des seances de l'Academie des Sciences*. Vol. CLXXII, No. 2, pp. 105-107. Paris, 1921.

THE INTERNATIONAL REVIEW OF AGRICULTURAL ECONOMICS.

The following is a brief indication of the contents of the more important articles in the March-April number of the Institute Bulletin. Persons interested in any of the articles may obtain the original Bulletin on application to the Institute Branch, Department of Agriculture, so long as the supply for distribution is not exhausted.

The Encouragement of Agricultural Co-operation During and Since the War in Great Britain and Ireland.—22 pages.

For some years previous to the war it had been part of the settled policy of the British Government to give encouragement to agricultural co-operation. This policy found expression in the sections introduced into various Acts of Parliament, such as the Small Holdings and Allotments Acts of 1907 and 1908, the Development and Road Improvement Funds Act, 1911, and the Small Landholders (Scotland) Act, 1911, authorizing grants to be made for its encouragement out of State funds. The war brought about no very striking development of this policy though some large special grants were given either during the war or immediately after the cessation of hostilities. It did, however, result in a more general recognition by the Government of the importance of agricultural co-operation, as was evidenced by the speeches of the Ministers and by the recommendations of various committees of inquiry. Moreover, for the solution of certain problems connected with the food supply, co-operative methods were adopted on the initiative of the Government itself.

The article gives a statement of the financial encouragement given by the State to the promotion of agricultural co-operation, an account of the special application of co-operative methods to war-time problems, and an account of the State encourage-

ment which, though not originally a war measure, was continued during the war.

Measures Adopted in Italy During the War to Encourage Agricultural Co-operation.—42 pages.

In the early part of the war, owing to the general mobilization which deprived all undertakings of their youngest and strongest employees and to the concentration of all efforts and all energies on the immediate object of preparation for carrying on the war, the co-operative movement in Italy had a temporary set-back and was almost brought to a standstill. Subsequently, however, when it became necessary to take steps to ensure the food supply and to strengthen the economic resistance of the country, the policy followed by the Government in regard to the production and distribution of food stuffs and to public works, agricultural credit and home colonization, contributed in no small degree to the development of co-operative distributive societies, co-operative societies for production and labour, and agricultural co-operative societies, which, already numerous in Northern and Central Italy, have spread also in Southern Italy. After the cessation of hostilities, the necessity of speeding up the resumption of the normal productive activity gave rise everywhere to new and fruitful enterprises, in which co-operation could not fail to play an important part, and thus co-operation, encouraged as it was by adequate State-aid, became a powerful instrument for the economic reconstruction of Italy.

The present article describes the different provisions which were made between 1914 and 1920 for the encouragement of co-operation.

Agricultural Credit in France During the War.—6 pp. There has been in France

little development of agricultural credit other than co-operative. This is due to the fact that the needs of agriculturists are effectively met by co-operative credit, for which capital has been provided on a large scale. Even in dealing with matters apparently in no way germane to co-operative credit, such as loans for the purchase of small holdings granted to ex-service men in receipt of pensions or to civilian sufferers by the war, the State also grants credit through the medium of co-operative banks, with the aim of thus enrolling fresh support for the cause of co-operative credit.

Non-co-operative credit has been employed in two directions only as an outcome of the war:

1. Advances of compensation due for damage resulting from the war.

2. Loans for recultivation of abandoned lands.

These loans are discussed in detail in the article.

Measures Taken in Austria During the War to Maintain the Supply of Agricultural Labour.—15 pages. Describes the harvest commissions and labour exchanges, and gives an account of the agricultural work of soldiers temporarily detached, the utilization of the work of wounded men, prisoners' labour, employment of schoolchildren and refugees, etc.

The Maintenance of the Supply of Agricultural Labour in England During the War.—29 pages. The second installment of this article. It gives an account of the use of soldier labour, and of the employment of interned civilians and prisoners of war.

Other articles in the March-April number are: The Danish Co-operative Egg Export Society Since the War; Guiding Principles for the Formation of Co-operative Agricultural Credit Banks; Co-operative Dairies in Holland in 1920; Mortgage Credit in Holland in 1920; The American Live Stock Loan Pool; the Law Relating to Agricultural Pledges in Uruguay.

AGRICULTURAL STATISTICS

FOREIGN CROP SUMMARY

(August 21, 1922)

United Kingdom.—The weather was unsettled and showery during the last part of July, but improved early in August when harvesting was general. The wheat crop of England and Wales is provisionally estimated as 63,000,000 bushels compared with 70,000,000 last year.

France.—Weather was favourable during the month of July. At the middle of August good progress had been made with the harvest, but the yield of wheat was officially stated to be below average.

Italy.—Conditions for harvesting were favourable. The production of wheat is officially estimated as 162,000,000 bushels against 192,000,000 last year. The quality is reported to be good.

Germany.—In the first part of July rains were abundant but came too late to benefit the cereal crops. Harvesting was late on account of the backwardness of vegetation. The wheat yield is officially reported to be below average.

Czechoslovakia.—July weather was favourable, but harvesting was late on account of the backwardness of the crops. The latest reports indicate a yield less than that of last year.

Jugoslavia.—Weather was favourable in July and the wheat crop was expected to be larger than that of last year.

Roumania.—Dry, hot weather prevailed during harvest which was practically completed on the first of August. Wheat and rye were expected to show good yields.

Russia.—According to Broomhall it has been authoritatively stated that the grain crop of Russia this year will be sufficient to meet the requirements of the population. The condition of the crops is reported to be good.

North Africa.—The wheat crop in Upper and Middle Egypt was reported to be above average, and below average in Lower Egypt. The combined wheat crops of Algeria, Tunis and Morocco are estimated as 30,000,000 bushels compared with 62,000,000 last year.

India.—According to the latest report from the Viceroy the agricultural situation was generally good. Over most of the country the monsoon was good and well distributed. Although the wheat crop of last spring was 366,000,000 bushels against 247,000,000 the previous year, the embargo against the export of wheat has not yet been lifted.

THE AGRICULTURAL GAZETTE OF CANADA

Argentina.—Rains were general during the last week in June and the first week in July. Where floods did not occur, the rains benefited the wheat and flaxseed which by July 7th was nearly all sown in the north, although ploughing and sowing were still active in the south. By the third week in July field work

was becoming difficult. According to latest reports the outlook was regarded as promising.

Australia.—Extensive rains fell in New South Wales in the latter part of July. The outlook generally was only fair on account of lack of moisture early in the season.

WORLD'S PRODUCTION OF WHEAT

European countries as at present	1922	1921	Average 1916-20	Pre-war average 1909-13	European countries as before the war
	Bushels	Bushels	Bushels	Bushels	
Great Britain and Ireland.....	67,000,000*	73,795,000	68,681,000	59,640,000	Great Britain and Ireland.
France.....	264,000,000	315,068,000	209,249,000	317,639,000	France.
Belgium.....	10,186,000*	14,495,000	7,452,000	14,894,000	Belgium.
Netherlands.....	5,218,000*	8,686,000	5,006,000	4,896,000	Netherlands.
Denmark.....	7,000,000	11,207,000	5,997,000	5,344,000	Denmark.
Norway.....	750,000	972,000	781,000	306,000	Norway.
Sweden.....	8,230,000*	12,577,000	8,947,000	8,103,000	Sweden.
Finland.....	297,000*	280,000	254,000	251,000	Finland.
Spain.....	125,908,000*	145,151,000	139,715,000	130,447,000	Spain.
Portugal.....	7,500,000	8,613,000	8,597,000	6,985,000	Portugal.
Italy.....	162,407,000*	192,838,000	168,187,000	183,336,000	Italy.
Switzerland.....	3,748,000*	5,284,000	6,029,000	3,314,000	Switzerland.
Luxembourg.....	500,000	661,000	781,000	615,000	Luxembourg.
Germany.....	86,000,000	107,800,000	81,143,000	152,120,000	Germany.
Alsace-Lorraine.....	6,000,000	7,702,000	3,763,000	19,045,000	Poland (Russian).
Poland (new).....	44,364,000*	35,576,000	22,741,000		
Czecho-Slovakia.....	35,000,000	40,674,000	26,362,000		
Austria.....	5,000,000	6,452,000	5,269,000	60,842,000	Austria.
Hungary.....	45,754,000*	52,716,000	38,295,000	169,645,000	Hungary.
Roumania.....	80,000,000	75,592,000	61,310,000	87,792,000	Roumania.
Jugo-Slavia.....	55,000,000	51,867,000	43,001,000	14,746,000	Serbia.
Bulgaria.....	34,343,000*	42,510,000	30,000,000	41,994,000	Bulgaria.
Greece.....	9,553,000*	11,170,000	11,001,000	9,400,000	Greece.
Total Europe.....	1,063,758,000	1,221,686,000	952,561,000	1,291,354,000	

Countries	1922	1921	Average	Pre-war average 1909-13
	Bushels	Bushels	Bushels	Bushels
NORTH AMERICA—				
Canada.....	320,968,000*	300,858,000	228,410,000	197,118,000
United States.....	805,000,000*	794,893,000	799,000,000	686,697,000
Total North America.....	1,125,968,000	1,095,751,000	1,027,410,000	883,815,000
ASIA—				
India.....	366,539,000*	247,072,000	344,736,000	351,767,000
Japan.....	26,495,000*	26,921,000	30,246,000	24,166,000
Total Asia.....	393,034,000	273,993,000	374,982,000	375,933,000
AFRICA—				
Algeria.....	16,902,000*	33,764,000	25,730,000	34,998,000
Egypt.....	32,000,000	37,011,000	32,073,000	34,121,000
Morocco.....	9,533,000*	17,466,000	19,025,000	18,202,000
Tunis.....	3,307,000*	10,623,000	7,395,000	6,224,000
South Africa.....	8,000,000	8,689,000	7,304,000	6,127,000
Total Africa.....	69,742,000	107,553,000	91,527,000	99,672,000
SOUTH AMERICA—				
Argentina.....	171,000,000	154,875,000	171,017,000	147,072,000
Chili.....	22,000,000	22,179,000	21,801,000	21,243,000
Uruguay.....	12,000,000	12,125,000	7,811,000	6,519,000
Total South America.....	205,000,000	189,179,000	200,629,000	174,834,000
AUSTRALASIA—				
Australia.....	107,000,000	136,168,000	106,637,000	90,500,000
New Zealand.....	8,000,000	10,500,000	5,978,000	7,070,000
Total Australasia.....	115,000,000	146,668,000	112,615,000	97,570,000
World's Total.....	2,972,502,000	3,034,830,000	2,759,724,000	2,923,178,000

*The figures in the 1922 column followed by an asterisk are official, the others are estimates based on acreage and condition reports.

THE AGRICULTURAL GAZETTE OF CANADA

The striking feature of the statistical situation of wheat as disclosed in the above table is the reduction in the production of the countries of Europe. The indications are that the total wheat crop of Europe will be about 160,000,000 bushels less than that of last year. Besides, there is a reduction of 38,000,000 in North Africa. The European total is also 228,000,000 bushels less than the pre-war average.

In considering the world's totals it must be remembered that the harvest in the southern hemisphere will not take place until December. In making estimates for Argentina and Australia and other southern countries it is assumed that average crops will be harvested.

In spite of the increase of 30,000,000 bushels in North America and 120,000,000 in Asia the indicated world's total is 63,000,000 bushels less than last year.

ACREAGE AND PRODUCTION OF RYE, BARLEY AND OATS

RYE

Countries	Area			Production		
	1922	1921	Average 1916-20	1922	1921	Average 1916-20
	Acres	Acres	Acres	Bushels	Bushels	Bushels
Belgium.....	530,000	559,000	441,000	18,598,000	21,273,000	9,742,000
Bulgaria.....	481,000	489,000	464,000	8,761,000	8,390,000	6,056,000
Spain.....	1,702,000	1,786,000	1,815,000	27,340,000	28,118,000	26,911,000
Jugo-Slavia.....	369,000	471,000	489,000	.....	5,770,000	6,091,000
Finland.....	588,000	606,000	592,000	7,669,000	10,385,000	9,422,000
France.....	2,087,000	2,163,000	2,079,000	.....	44,494,000	35,535,000
Greece.....	198,000	222,000	106,000	2,362,000	3,151,000	1,241,000
Hungary.....	1,340,000	1,370,000	1,475,000	19,695,000	23,177,000	20,564,000
Italy.....	284,000	287,000	278,000	.....	5,634,000	4,829,000
Netherlands.....	.....	492,000	485,000	.....	16,646,000	13,096,000
Poland.....	10,829,000	8,838,000	7,236,000	201,534,000	167,217,000	73,660,000
Sweden.....	.....	913,000	903,000	.....	27,812,000	20,039,000
Roumania.....	533,000	807,000	780,000	.....	8,813,000	9,445,000
Switzerland.....	57,000	57,000	53,000	.....	1,800,000	1,559,000
Czecho-Slovakia.....	2,160,000	2,183,000	2,238,000	.....	54,382,000	32,942,000
Canada.....	2,480,000	1,843,000	464,000	37,848,000	21,455,000	7,350,000
United States.....	5,148,000	4,228,000	4,927,000	79,600,000	57,918,000	67,773,000

BARLEY

Countries	Area			Production		
	1922	1921	Average 1916-20	1922	1921	Average 1916-20
	Acres	Acres	Acres	Bushels	Bushels	Bushels
Belgium.....	86,000	96,000	84,000	3,991,000	5,117,000	3,900,000
Bulgaria.....	554,000	551,000	554,000	12,061,000	13,241,000	9,451,000
Spain.....	4,217,000	4,335,000	4,135,000	74,795,000	89,321,000	85,518,000
Jugo-Slavia.....	484,000	924,000	926,000	.....	13,274,000	13,199,000
Finland.....	297,000	296,000	287,000	5,029,000	5,939,000	4,771,000
France.....	1,427,000	1,648,000	1,571,000	.....	37,805,000	32,334,000
Greece.....	.....	.....	496,000	.....	6,430,000	6,230,000
Hungary.....	1,130,000	1,187,000	1,266,000	.....	21,408,000	22,586,000
Italy.....	544,000	540,000	503,000	.....	10,362,000	8,283,000
Netherlands.....	.....	62,000	57,000	.....	3,651,000	2,452,000
Poland.....	2,752,000	2,430,000	1,944,000	62,905,000	53,306,000	38,567,000
Roumania.....	3,809,000	3,878,000	3,460,000	.....	49,404,000	67,606,000
Sweden.....	.....	400,000	424,000	.....	12,326,000	12,070,000
Switzerland.....	16,000	16,000	19,000	.....	552,000	637,000
Czecho-Slovakia.....	1,686,000	1,583,000	1,717,000	.....	47,366,000	37,238,000
Canada.....	2,732,000	2,796,000	2,509,000	64,881,000	59,709,000	58,962,000
United States.....	7,550,000	7,240,000	8,150,000	191,507,000	151,181,000	197,443,000
Japan.....	.....	2,929,000	2,941,000	85,849,000	87,883,000	93,648,000
Algeria.....	2,784,000	2,508,000	2,829,000	18,886,000	48,226,000	36,772,000
Morocco.....	2,150,000	1,905,000	2,147,000	22,506,000	29,510,000	33,093,000
Tunis.....	667,000	1,230,000	1,173,000	1,837,000	11,482,000	6,788,000

THE AGRICULTURAL GAZETTE OF CANADA

OATS

Countries	Area			Production		
	1922	1921	Average 1916-20	1922	1921	Average 1916-20
	Acres	Acres	Acres	Bushels	Bushels	Bushels
Belgium.....	701,000	604,000	573,000	29,327,000	33,153,000	21,076,000
Bulgaria.....	367,000	407,000	345,000	10,797,000	10,609,000	6,592,000
Spain.....	1,512,000	1,575,000	1,497,000	32,871,000	33,521,000	31,320,000
Jugo-Slavia.....	103,000	1,021,000	1,027,000	.....	17,327,000	20,938,000
Finland.....	988,000	1,038,000	1,069,000	26,164,000	26,380,000	22,898,000
France.....	7,905,000	8,328,000	7,787,000	.....	230,786,000	214,423,000
Greece.....	.....	.....	243,000	.....	3,891,000	3,681,000
Hungary.....	818,000	807,000	802,000	.....	20,672,000	20,995,000
Italy.....	1,186,000	1,199,000	1,143,000	.....	35,553,000	30,915,000
Netherlands.....	.....	378,000	381,000	.....	20,036,000	19,966,000
Poland.....	5,718,000	4,738,000	4,119,000	178,549,000	140,979,000	121,471,000
Roumania.....	2,637,000	3,062,000	2,388,000	.....	58,432,000	64,329,000
Sweden.....	.....	1,757,000	1,836,000	.....	72,093,000	65,412,000
Switzerland.....	52,000	53,000	67,000	.....	2,857,000	3,653,000
Czecho-Slovakia.....	2,031,000	2,003,000	1,981,000	.....	28,097,000	56,145,000
Canada.....	17,189,000	16,949,000	13,981,000	509,752,000	426,232,000	432,924,000
United States.....	41,822,000	44,826,000	42,456,000	1,251,156,000	1,060,737,000	1,329,518,000
Japan.....	.....	.....	189,000	10,841,000	11,375,000	7,317,000
Algeria.....	596,000	558,000	587,000	5,239,000	9,726,000	13,347,000
Tunis.....	119,000	165,000	153,000	908,000	3,891,000	2,886,000

NORTH AMERICAN CROPS

The North American crops this year show last year, with the finest crops in Canada a wonderfully fine condition compared with since 1915.

	1922	1921	Changes
Wheat—			
United States.....	805,000,000	795,000,000	Inc. 10,000,000
Canada.....	321,000,000	301,000,000	" 20,000,000
Total.....	1,126,000,000	1,096,000,000	" 30,000,000
Oats—			
United States.....	1,251,000,000	1,061,000,000	" 190,000,000
Canada.....	510,000,000	466,000,000	" 44,000,000
Total.....	1,761,000,000	1,527,000,000	" 234,000,000
Rye—			
United States.....	79,600,000	57,900,000	" 21,700,000
Canada.....	37,800,000	21,400,000	" 16,400,000
Total.....	117,400,000	79,300,000	" 38,100,000
Hay—			
United States.....	110,300,000	96,800,000	" 13,500,000
Canada.....	15,500,000	11,400,000	" 4,100,000
Total, tons.....	125,800,000	108,200,000	" 17,600,000
Potatoes—			
United States.....	440,000,000	347,000,000	" 93,000,000
Canada.....	103,000,000	107,000,000	Dec. 4,000,000
Total.....	543,000,000	454,000,000	Inc. 89,000,000

AN INVESTMENT that Increases in Value the longer it is Held.

AN INVESTMENT you can Realize upon immediately, without loss.

AN INVESTMENT that will yield $5\frac{1}{2}\%$ Interest, compounded half-yearly.

AN INVESTMENT that is backed by All the Resources of Canada.

is offered you in

Dominion of Canada Savings Certificates

Denominations to suit every Investor

\$5

\$10

\$25

\$50

\$100

Obtainable at the following Prices:

\$4.25 \$8.50 \$21.25 \$42.50 \$85.00

at any Bank or Money Order Post Office

"INVEST TO-DAY!"

"SAVE BEFORE YOU SPEND !!"

Issued by The Finance Department, Ottawa

DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
PUBLICATIONS BRANCH

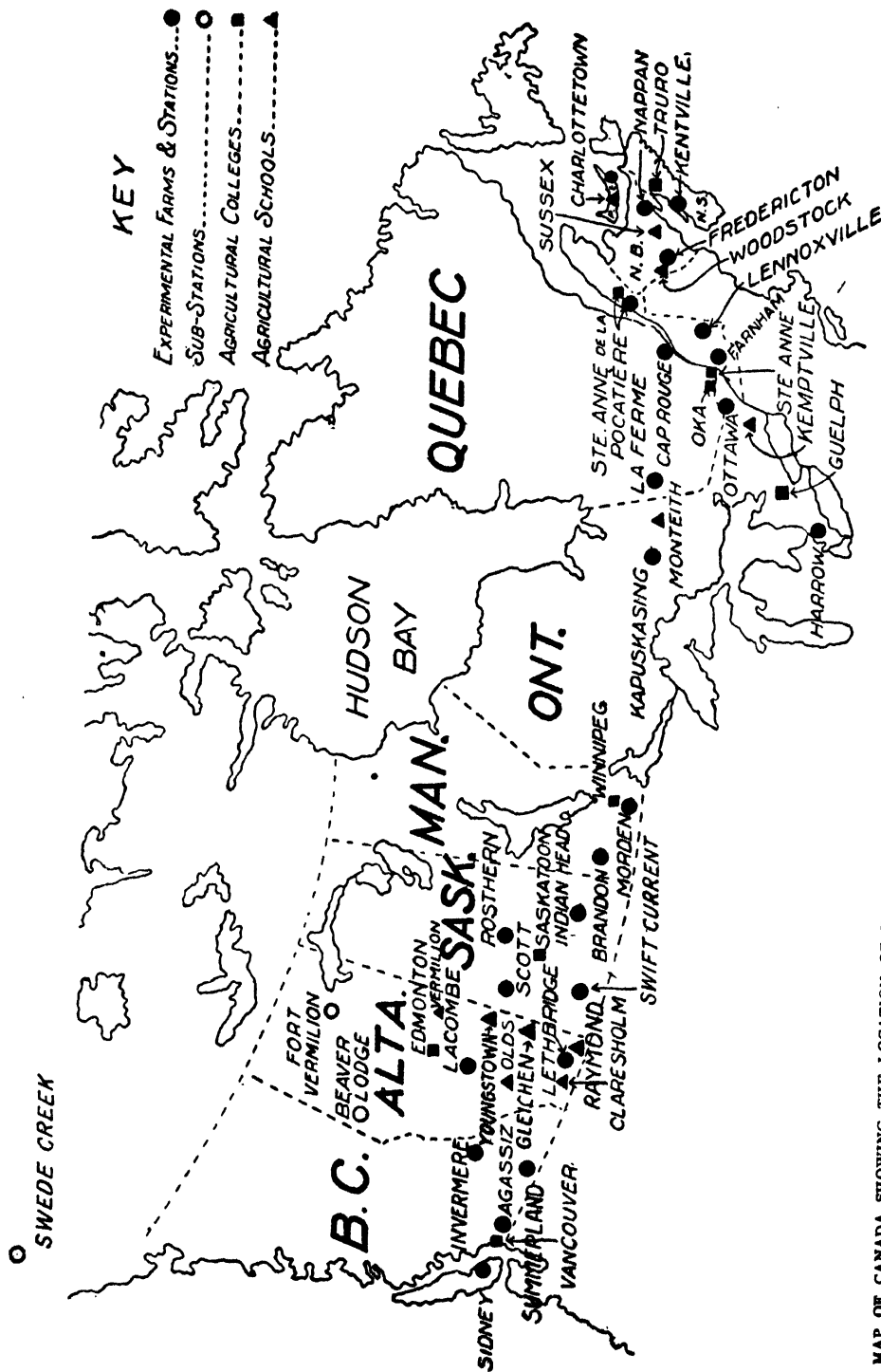
Vol. 9: No. 6

November-December, 1922

The AGRICULTURAL GAZETTE OF CANADA

J. B. SPENCER, Director of Publicity
Wm. B. VARLEY, Editor

Issued by authority of the Honourable W. R. Motherwell, Minister of Agriculture
OTTAWA



MAP OF CANADA SHOWING THE LOCATION OF FARMS, STATIONS AND SUB-STATIONS IN THE EXPERIMENTAL FARMS SYSTEM, THE AGRICULTURAL COLLEGES AND AGRICULTURAL SCHOOLS

CONTENTS

	PAGE
RADUATE STUDY IN AGRICULTURE, <i>by Dr. F. C. Harrison; Dr. L. S. Klinck; President J. B. Reynolds; Ex-President John Bracken, Dean Howes, and Dean Rutherford</i>	467

PART I

DOMINION DEPARTMENT OF AGRICULTURE

THE CAP ROUGE EXPERIMENTAL STATION, <i>by Gus. Langelier, Superintendent</i>	476
THE MEAT AND CANNED FOODS INSPECTION SERVICE, <i>by Robt. Barnes, V.S.</i>	479
THE MARKETING OF CANADIAN FRUIT AND VEGETABLES, <i>by G. E. McIntosh, Commissioner</i>	481

PART II

PROVINCIAL DEPARTMENTS OF AGRICULTURE

THE AGRICULTURAL INSTRUCTION GRANT IN BRITISH COLUMBIA—Summary of Activities, 1913-1922:—	
I The Department of Agriculture.....	485
II Elementary Agricultural Education.....	490
III University of British Columbia, Faculty of Agriculture.....	493
RÉSUMÉ OF AGRICULTURAL INSTRUCTION WORK IN PRINCE EDWARD ISLAND.....	495
DAIRYING AT THE OKA AGRICULTURAL INSTITUTE, QUEBEC, <i>by Rev. Br. Isidore</i>	498
AGRICULTURAL MERIT DAY IN QUEBEC.....	505
AGRICULTURAL MERIT AWARD.....	506
BETTER FARMING TRAIN IN THE PROVINCE OF QUEBEC.....	507
THE CONGRESS OF QUEBEC WOMEN'S CLUBS.....	508
MICHIGAN STATE EXTENSION SERVICE AND FARM BUREAUS, <i>by W. D. Jackson</i>	508
THE FARM BUREAU AND ITS BRANCHES, <i>by R. Shuyler</i>	510
THE MICHIGAN FARM BUREAU EXCHANGES, <i>by A. C. Knight</i>	512
IMPRESSIONS FROM A TRIP THROUGH THE STATE OF MICHIGAN, <i>by W. P. Macdonald</i>	513
GIRLS' CLUB WEEK IN MANITOBA, <i>by S. T. Newton</i>	514
"FIELD DAYS" IN SASKATCHEWAN.....	516
A SEED GRAIN MARKETING PLAN FOR ALBERTA.....	517

PART III

AGRICULTURAL EDUCATION AND RELATED ACTIVITIES

AGRICULTURAL INSTRUCTION IN THE ELEMENTARY SCHOOLS, <i>by F. W. Bates, M.Sc., Saskatchewan; R. G. Vaughan, Manitoba; Dr. J. B. Dandeno, Ontario</i>	518
---	-----

PART IV

SPECIAL CONTRIBUTIONS, REPORTS OF AGRICULTURAL ORGANIZATIONS, PUBLICATIONS AND NOTES

THE PASTEURIZATION PROCESS AND ITS EFFECT ON THE VITAMIN CONTENT OF MILK, <i>by A. Bruce Macallum, M.D., Ph.D.</i>	524
DAIRY PRODUCTS, PRODUCTION AND VALUE.....	528
NEWS ITEMS AND NOTES.....	529
APPOINTMENTS AND STAFF CHANGES.....	532
THE LIBRARY.....	533
NEW PUBLICATIONS.....	536

PART V
THE INTERNATIONAL INSTITUTE OF AGRICULTURE

	PAGE.
FOREIGN AGRICULTURAL INTELLIGENCE—	
Science and Practice of Agriculture.....	538
Crops and Cultivation.....	538
Live Stock and Breeding.....	544
Farm Implements.....	546
Agricultural Industries.....	546
Plant Diseases.....	548
Injurious Insects.....	549
Other Articles on Science and Practice of Agriculture.....	551
THE INTERNATIONAL REVIEW OF AGRICULTURAL ECONOMICS.....	552
AGRICULTURAL STATISTICS.....	554

THE AGRICULTURAL GAZETTE OF CANADA

INDEX TO VOLUME IX.....	563
-------------------------	-----

The AGRICULTURAL GAZETTE OF CANADA

VOL. IX

NOVEMBER-DECEMBER, 1922

No. 6

GRADUATE STUDY IN AGRICULTURE

At the Second Annual Convention of the Canadian Society of Technical Agriculturists held at Macdonald College in July last, the Principal of that institution, Dr. F. C. Harrison, introduced the subject of Graduate Study in Agriculture. Because of the importance of the matter to Canadian Agriculture and the desire that exists among graduates that facilities for Post-Graduate work be made more fully available within the Dominion, it has been decided to publish Dr. Harrison's address. As a further contribution to the subject, an expression of views has been secured from the heads of a number of institutions directly concerned. — *Editor.*

DR F. C. HARRISON, PRINCIPAL, MACDONALD COLLEGE

MODERN education has reached a very intensive stage. In the last fifty years the progress has been phenomenal. Discovery has trod on the heels of discovery, science has laid bare the secrets of nature, new sciences have emerged with a leap like Pallas Athene who sprang forth from the head of Zeus with a mighty war shout and in complete armour. In her, power and wisdom were harmoniously blended, and our modern sciences quite fittingly take her place. Commensurate with this progress and advance of science, we have been brought to an age of specialism as it is impossible for one man to master even the whole of a science, and the interlocking of many sciences has brought forth the necessity for broad and comprehensive training. For example, thirty years ago there was a professor of Natural History and Geology at the Ontario Agricultural College. Some years later his work was divided and professors of Horticulture, Botany, Entomology, and Bacteriology were created. These have again been subdivided in some of our Canadian institutions and the sub-division has been even more extensive in American agricultural colleges. For example, instead of a professor of Botany there may be found professors of Economics, Botany, Ecology, Cryptogamic Botany, Plant Pathology, Algology, etc. Entomology has also been divided and we have professors devoting themselves to a single order. This evolution takes place more intensively in other sciences, until teachers have found that it is impossible to cram into four years of undergraduate life, all that is thought necessary for such a man to know. Hence, in a number of faculties the course has been considerably lengthened. For example, in medicine six year courses are quite common, and after the completion of such a course a graduate walks the hospitals for several additional years. In some institutions the B.A. is necessary as a prerequisite to registration in medicine.

In law, the courses have been lengthened. In many institutions the B.A. is required for entering the study of law.

THE AGRICULTURAL GAZETTE OF CANADA

In arts, men who specialize in History, Economics, Education, are bound to go forward for advanced degrees if they desire to find situations.

In applied science, the same course is followed, e.g., chemical engineers, mining and electrical engineers, etc., have to spend considerable time in apprenticeship before they can find situations.

How is it in agriculture? Let us first examine the field. Agriculture in many respects closely approaches medicine. The sciences of Chemistry, Biology, Physics, Bacteriology, in their widest application, are the foundations on which both sciences are built. The undergraduate in agriculture has a very large number of subjects to assimilate. In addition to the sciences mentioned there are the professional subjects, Animal Husbandry, Agronomy, Horticulture, Poultry, Farm Engineering, English, Economics, Mathematics, and in the attempt to reduce the number of subjects, many institutions permit students to either specialize or select certain subjects in order to reduce the task of the student. Often the result is the building of a rather frail foundation in the science subjects, and the general result may be stated by saying that after four years of study, really amounting to about 32 months of lecture and laboratory work, the student is ready to go forward, and, if of sufficient standing, to take up postgraduate work. But if the exigencies of medicine call for now at least six years of work and more often seven and eight, surely agriculture needs as much for men who are to teach or do research work.

In a few words, the amount and nature of work in agriculture is now so large that it is impossible for the average student to obtain the necessary training and assimilate the necessary facts in four years of undergraduate work.

The field of research is vast, and the results that may be expected from well planned and properly carried out research have the added stimulus that such work is of high practical utility.

The soil offers many problems, its biological activities, the solution of the soil acidity problem in the East, and the probability of its relation to soil toxicity, clover sickness, etc., the aerial denudation of soils in the West, the quick decomposition of vegetable debris like straw, the unlocking of the fertility, the treatment of alkali soils, etc. With these are related problems in tillage, drainage, irrigation, dry farming, etc.

The plant offers inexhaustible problems—yields, early maturity, hardiness, breeding for disease resistance, breeding for certain chemical constituents. Its relation to disease induced by fungi, bacteria and insects—methods of control and prevention, involving a profound knowledge of the sciences, Genetics, Biochemistry, Botany, Plant Pathology, Bacteriology, Entomology, etc.

The animal likewise involves problems in breeding and Genetics, Chemistry of Nutrition, Biochemistry, Veterinary Science. How much may the science Biochemistry come to the assistance of the cattle feeder? How has the discovery of vitamins altered our conception of the feeding of the young and adolescent animal? Then there is the problem of calcium assimilation. Have we an intelligent conception of contagious abortion, of goitre and its causes, of methods of dealing with tuberculosis, and many more diseases to which all kinds of stock are subject? Further, there are the products from plant and animal, the problems of the dairyman in his provision of clean milk, good butter and cheese and wholesome by-products. There are also the numerous problems connected with farm engineering, sanitation, drainage, mechanics of farm power, etc. Truly the number of subjects is vast and the opportunities are many.

What are we doing to cope with these large and small problems? Are we seized with the importance of thoroughly training men to devote their time to such work? What kind of training should we give? How can we induce our

THE AGRICULTURAL GAZETTE OF CANADA

graduates to see the importance of this work? These are some of the questions that we may ask ourselves.

Two kinds of advanced work seem to be indicated:—

1. Preparation for teaching, including not only the training of men for teaching in our colleges, but also training for extension work, which in the final analysis is a form of teaching.

2. Preparation for research work.

In both the immediate aims differ from those of undergraduate study. The graduate student must learn to develop the power of independent work, to become filled with the true spirit of research, to specialize without becoming narrow, to read widely and become familiar with the literature of his chosen subjects.

With regard to teaching or degrees for agricultural education, it may be noted that in certain institutions in the United States, a very large number of Doctor's degrees are granted every year in the subject of education. Columbia and Chicago, to mention two institutions, have very numerous students taking work in higher education. We need a degree in agricultural education; we require men who, while technically well supplied with material, need extensive courses in the principles of vocational education, in methods of teaching, practice teaching and research in education. Even if we do not go so far as the Doctor's degree, more might be done to equip men by an extra year's training in the subjects above mentioned. Men with this training should also be able to give better service in extension work, as they would know how to present their subjects in the best manner to a farmer audience.

For research men, who desire to take either their Master's or Doctor's degree course work, the acquisition of a reading knowledge of two languages and a problem or thesis showing distinct originality together with a mastery of the literature of the subjects chosen are the usual requirements for any kind of degree. But no matter what line the student may elect in agriculture, he is practically forced to take intensive courses in one or other of the sciences. For example, if he desires to go forward to an advanced degree in Animal Husbandry, he will need a thorough grounding in Genetics including the cell, cytology and embryology. In Nutrition he will need Animal Chemistry, Biochemistry, the Physiology of the Digestive Glands. The same is also true for men who desire to specialize in Poultry. The Horticultural specialists will need courses in Genetics, Botany, and one or other of its sub-divisions, the Chemistry of Soils and Fertilizers. Students who desire to specialize in the Soils will find a very heavy programme of work including Chemistry, Biochemistry, Physical Chemistry, Zoology, Bacteriology. Crop or Agronomy specialists will need Genetics, Chemistry, Biochemistry, Botany, etc.

It will be seen, therefore, that the sciences are absolutely fundamental for any of the so-called practical branches of agriculture, and when we turn to the sciences we shall find that it is now necessary for even specialists to have a wide knowledge of more than one science because of the interlocking of subjects; special problems often involving a thorough knowledge of Biochemistry, Physical Chemistry, Botany, Bacteriology, etc.

The Demand for Well Trained Men.—Our Agricultural Colleges or Faculties of Agriculture of Universities, and Government departments needing scientific help are looking for well trained men, men who have not only their B.S.A. degree, or its equivalent, but who have something further. Teachers are required who understand how to teach. Research men are needed who can conduct independently original research.

At the recent Universities' Conference held in Winnipeg, great attention was given by the Conference to the problem of their research men, and it was thought that all our universities should do what they can to train Canadian students. Certain universities have recently established graduate faculties, and it was voted by the Conference that the subject of the greatest importance for the next discussion was to be the subject of graduate work. Several Deans of Agricultural Faculties deplored the lack of trained men and stated that they had to go to the other side to find them. The Dominion Government recently wanted men in certain lines for expert work, but could not find them in Canada with sufficient training. Hence, it seems that not only must Canadian colleges do something to supply this demand, but we must also induce more B.S.A.'s to take up graduate work. A start has been made in some institutions. The Faculty of Agriculture of the University of Saskatchewan has granted several scholarships and has placed on its curriculum a number of graduate courses.

Recently, McGill University re-organized its Graduate Faculty, and due attention has been given to a number of agricultural subjects in this Faculty. The degrees offered are those of M.S.A., M.Sc., and Ph.D., and graduate students can specialize in Agronomy, Bacteriology, Chemistry, Entomology, Plant Pathology, and Poultry, and it will be possible for students to use both the resources of McGill University and those of Macdonald College.

At Macdonald we are well equipped for graduate work. There are twelve men on the staff with advanced degrees, nine of them with their Doctor's degree. There are excellent laboratories and there is good accommodation generally. The situation of Montreal as the export centre of Canada gives many facilities for those who desire to study marketing. Both French and English languages are spoken, permitting students to acquire a knowledge of a second language with little difficulty. Good individual attention can be given to students, and it is hoped that this Canadian effort will be appreciated by those desiring to take up post-graduate work.

DR. L. S. KLINCK, PAST-PRESIDENT, CANADIAN SOCIETY OF TECHNICAL AGRICULTURISTS: PRESIDENT, UNIVERSITY OF BRITISH COLUMBIA

Of the many issues which have engaged the attention of the Canadian Society of Technical Agriculturists since its organization two years ago, that of agricultural education has come to occupy a foremost position. Each convention has seen this question emerge more clearly and gradually assume more definite form.

This statement is particularly true in regard to advanced agricultural education. The need for post-graduate courses is becoming more generally recognized and the demand for their establishment is growing more insistent. Technical agriculturists have come to realize the necessity for raising the status of their profession, and are of opinion that the best way to do this is to see that ample and varied post-graduate courses are provided in one of the Canadian agricultural colleges.

Favourable consideration of this question by the administrative heads in our colleges of agriculture was urged, at the last convention, by the older graduates even more strongly than by those of more recent standing. The fact that many of the earlier graduates had not taken advanced degrees, detracted in no way from the effectiveness of their advocacy of post-graduate courses, but constituted an indirect proof of their sincerity and of their integrity of purpose. Twenty years ago, personal or professional pride might have rendered it very difficult for some of the graduates of that time to make as strong a presentation of the case for advanced study as they made when the Report of the Committee on Agricultural

Education was under discussion. That post-graduate courses in agriculture were not offered in Canada at the time these men obtained their Bachelor degrees, only strengthened their determination to see that the younger men in the profession should be given every opportunity and facility to proceed to advanced work in one of our own agricultural colleges.

The expression of this conviction was not confined to a few individuals or to one or two groups. Representatives of every department of agricultural endeavour—farmers, administrators, professors, investigators, recent graduates, and undergraduates—were practically unanimous in declaring that the time had come for the immediate expansion of this neglected phase of our educational policy. As a result of this attitude on the part of the delegates, a strong committee was appointed to collect and compile data for presentation to the next convention with a view to facilitating the initiation of a more comprehensive and better co-ordinated system of post-graduate courses in the Dominion.

Never before in the history of agricultural education in this country has such an opportunity presented itself to the older colleges in Eastern Canada. Their position is an enviable one. The college which first comes within measurable distance of attaining unto the possibilities which this unique situation presents, will place itself in the vanguard of agricultural education in Canada; will permanently enhance its prestige; and will ensure its unchallenged leadership in this field of education for many years to come.

But such an opportunity cannot reasonably be expected to present itself much longer. The need is urgent; the demand is insistent; and, unless the older institutions avail themselves of the advantages the occasion affords, the younger colleges will be forced to extend the scope of the graduate instruction they are now giving.

The younger agricultural colleges in Canada are looking to the older ones to do for agricultural education what they, as more recently organized institutions, cannot do at present for themselves, viz., provide post-graduate courses to meet the needs of all students who may wish to proceed beyond the B.S.A. degree. Macdonald College has made a commendable beginning in this direction, but as yet she has not attracted many graduates other than her own, nor has she instituted advanced courses in subjects other than in the pure sciences.

Canada's population is too small and too widely scattered to justify the establishment of more than one fully staffed and equipped graduate school in agriculture. But such a school we must have, unless our more ambitious graduates are to continue to go the United States for post-graduate work, with the result that, in many cases, they are lost to us. Fortunately their going is not an unmixed evil, since all those who return are even more convinced than before of the necessity for expanding and enriching the curricula of our colleges, and for educating administrators and the public to the educational advantages and patriotic duty of adopting a more progressive policy.

The Dominion Government can influence educational policies only through federal grants. Unfortunately federal grants rarely stimulate provincial generosity, unless a proportional contribution is agreed upon. Since, however, the Dominion Department of Agriculture is largely dependent upon the agricultural colleges for the personnel of its technical staff, this Department might consider favourably the giving of financial support to one of the colleges for the purpose of assisting in the development of post-graduate courses.

The situation, as the writer sees it, is that one institution, properly staffed and equipped, would meet immediate requirements. Thus far the only agricultural college which has developed post-graduate work to any considerable extent is a privately endowed one. Unfortunately, jealousy among colleges is not unknown.

THE AGRICULTURAL GAZETTE OF CANADA

even when their appropriations come from different sources. It is conceivable then, that occasions for misunderstanding, and possibly for friction, might arise if one State supported institution were granted federal assistance and the others were not so favoured. This difficulty might be overcome, in a measure at least, were the Dominion Government to give assistance for this purpose only to Macdonald College.

It is immaterial in itself whether the institution which elects to undertake this task is state-supported, or privately endowed. The important consideration is that post-graduate work, on a scale commensurate with the needs and requirements of Canadian agriculture, be instituted without delay.

Some effective means must be found to provide advanced training in Canada for every agricultural graduate who is desirous of proceeding to an M.S.A., or a Ph.D. degree. Some means also must be found by which men, who are now occupying teaching or administrative position, may be given an opportunity to take advanced courses in their special subjects. The adoption of such a policy would be as much in the interests of the departments of agriculture, of the colleges, and of private or co-operative organizations, as it would be in the interests of the technical agriculturists themselves.

The adoption of the sabbatical year; the granting of leave of absence to teachers and investigators who may wish to take advanced courses; the institution of bursaries, scholarships and teaching fellowships, and more liberal remuneration for thoroughly trained men, have long been recognized as part of the settled policy of many institutions in other branches of higher education. In view of these facts one might fairly ask if there is any valid reason why the recognition of these principles should not be extended to include professors, investigators and other professional men engaged in agriculture.

In each province the responsibility for formulating and giving effect to the undergraduate courses rests with the authorities in the local institution. The same is true in regard to post-graduate courses. There is, however, a growing consensus of opinion that the time has come for agriculturists in Canada to think nationally, rather than provincially, on all matters pertaining to the wider interests of the profession. Of these wider interests, that of providing adequate post-graduate facilities is by no means the least. The leaders in agricultural thought are looking to the agricultural colleges for creative suggestions which will make possible national thinking and national action on this fundamental question.

J. B. REYNOLDS, M. A., PRESIDENT, ONTARIO AGRICULTURAL COLLEGE

All Canadian Agricultural Colleges are beginning to emphasize the necessity for graduate studies by members of the Teaching and Research Staff. This practice has become so general with all institutions of higher learning, that is, institutions above school grade, that any such institution which does not encourage or require graduate work of its staff, necessarily falls into a lower grade of institution. Especially is that true with respect to the B.S.A. degree as given at Guelph. It is a good course as a foundation but there is not sufficient specialization in it to justify a graduate calling himself a specialist until he has taken further work and preferably elsewhere. I have no particular sympathy with the craze for degrees which seems to prevail in some of the American institutions, as well as some Canadian institutions, but it is obvious that specialist standing in college work should not be granted to an instructor whose training has been for the most part general.

This college has intimated these views to the members of the staff, especially of course the junior members, and is making generous provision for any member of

the staff to follow graduate studies. It has been further intimated that graduates who join the staff with no more than the B.S.A. training need not expect promotion until some graduate work has been taken.

I am not at present prepared to say how facilities for graduate work in agriculture may be provided in Canada. I am sure that a good deal of it can be provided by the universities. The graduate work in the sciences resolves itself into a few important subjects like Biochemistry, Plant Pathology, Genetics, and Economics. The universities are provided with the men and equipment necessary to furnish graduate work in these subjects. Perhaps the more technical branches of Agriculture and Animal Husbandry may be ultimately provided at Ottawa. So far as this institution is concerned, much as we wish to encourage graduate studies and as much as we should like to offer some branches of graduate work here, we are at present too fully occupied with under-graduate work to consider this kind of extension.

JOHN BRACKEN, B. S. A., EX-PRESIDENT, MANITOBA AGRICULTURAL COLLEGE

The time has arrived, in my opinion, when facilities comparable with those offered elsewhere should be provided in Canada available to agricultural graduates who desire to equip themselves for research work in its more advanced forms. Agricultural Colleges in this country have not set themselves as yet to train men for research work of a high type. They have been concerned chiefly in turning out practical agriculturists and demonstrators in accordance with the prevailing demand. With the development of the country, however, a demand is arising for highly trained technical men to carry on various forms of research in connection with the more obscure problems which from time to time present themselves. Work of a purely scientific nature demands a high degree of specialization, and the usual graduate course must be regarded as affording merely the foundation for specialized work of the research type.

When positions calling for advanced qualifications occur—and they are beginning to occur with much more frequency than heretofore—men with the necessary training are not usually available in Canada, and have to be sought for in other countries. Those of our men who are qualified will be found to have taken post-graduate work elsewhere. We should not have to send our men outside of Canada for the necessary advanced training, nor should we have to import men either from the United States or some other country to do this type of work.

E. A. HOWES, B. S. A., DEAN, FACULTY OF AGRICULTURE, UNIVERSITY OF ALBERTA

The interest in graduate work in agriculture has increased very materially within the past three years. Several reasons are given but the most logical one would appear to be that of the impetus given to research work during the war, not only in destructive agencies but in productive agencies as well. The history of agriculture shows that this was the experience following other wars but for reasons that are obvious the impetus was not quite so marked, at least as far as we have record. Whatever the reason may be it is quite evident that in Canada we have reached a point where we can not long afford to neglect the question of advanced training for our young men who elect to follow the work which we have termed professional. One would indeed be blind or have wilfully shut his eyes if he did not see in the trend of discussion at the last meeting of the C. S. T. A. at Macdonald College the recognition of the fact that agricultural education in Canada must be put on a higher plane, and that for professional work the B. S. A. is but

THE AGRICULTURAL GAZETTE OF CANADA

the first step rather than the last step in the training necessary to meet requirements.

At the University conference held at Winnipeg a few weeks ago the writer had the privilege of giving a paper on research work in agriculture. In that paper he submitted three statements for serious consideration.

(a) We need trained men for research work that is pressing upon us to-day and these trained men are very difficult to get.

(b) With a few exceptions most of our young men take their graduate work in agriculture outside of Canada, because we cannot train specialists until we have teachers who are themselves trained.

(c) This is scarcely a condition, rather an admonition, that it will indeed be detrimental to the work if any of our institutions attempt to stage graduate work before they have equipment, in other words, if they try to do so with existing material.

It would appear that in the very near future, as far as professional work is concerned, the B.S.A. degree will be looked upon as simply the foundation credit in training for teaching and research, just as the B.A. degree is now regarded by so many young people as only a foundation for their professional career. We cannot ignore this fact much longer, especially as heads of agricultural colleges even now are professedly looking for men of higher training than B.S.A. This statement need not necessarily be taken as minimizing the credit or standing of men who are doing work in teaching and administration in Canada to-day, and who aside from honorary degrees, can write but B.S.A. after their names. These men have taken graduate work in the College of Experience, but it is doubtful if any of them will prescribe this course for their boys, if a properly constituted scheme of graduate training is available academically. In other words they may as well frankly accomplish their orientation to date and take a certain amount of satisfaction out of the recognition given them because of their graduate course in the said College of Experience. Let us be good old sports in the matter, and take comfort also from the fact that we are the last of a vanishing class, and are entitled to this much distinction at least.

In conclusion, mention may be made of the location of graduate work. The idea has been advanced by some thoughtful men that a single institution might do all the graduate work for Canada. Such an arrangement would have obvious advantages, but the writer doubts if it is practicable. Leaving out the fact of institutional autonomy as a more or less recognized condition, there remains the more difficult condition in the fact that boys who reach graduate work will themselves decide as to what institution they wish to attend, nor can the under-graduate instructors exert more than a partial influence in shaping their plans. This is caused by the fact that each college is strongest in some one or two departments and has achieved a name for teaching and research work in connection with these departments, and the boy will want to go where his specialty is being best advanced. It is manifestly impossible for a single institution to be outstanding in every department and therein lies the great difficulty with a centralized graduate college. There is also one other consideration and that is that every institution covets a quota of highly trained men, if it were only for the added dignity and tone given to the institution, not to speak of the inspiration derived from their presence in faculty. These arguments are submitted because the scheme to the writer appears rather an idealistic one, and therefore desirable; but appears from causes shown to be rather impracticable. In any case let our colleges, as soon as time and means will permit, secure trained men to handle graduate courses and let the student go to that institution which has best developed facilities for the particular branch in which he

wishes to specialize—better, too, that he go to an institution other than that from which he secured his undergraduate training—but above all let us see that the training is available in Canada.

W. J. RUTHERFORD, B. S. A., DEAN FACULTY OF AGRICULTURE, UNIVERSITY OF SASKATCHEWAN

THE need for agricultural research in Canada has been carefully pointed out on many occasions in recent years. It matters not what phase of agricultural effort one considers, the need for research is apparent. The soil and its effects upon plants and animals and upon the products of each is not at all well understood and presents many problems to the farmer, who must rely upon the well trained scientist for their solution. Field and orchard crops are in great need of revision. New crops must be found for many sections of Canada, and plant diseases and insect pests must be combatted. The animal industry craves for scientifically trained men to make it secure in our agricultural economy—feeds and feeding, management, breeding, preventing contagious and infectious diseases, and providing for live stock of various sorts an escape from the baneful effects of insect pests. Farm implements and machinery, farm buildings and, not least, the business management of the farm itself—including the selection of enterprises, the laying out of the fields, the selection and management of soils, crops and animals, equipment and labour, and the marketing of farm products—afford ample scope for improvement through research and investigation.

Every educational institution in Canada having to do with agricultural teaching or research is in quest of more highly trained men. An inviting field lies open to the graduates of Canadian institutions who equip themselves to attack problems of various kinds that are now confronting Canadian agriculture. Provision has been made at the University of Saskatchewan for giving courses leading to the Master's degree, with majors in the various departments of Soils, Field Husbandry, Animal Husbandry, including poultry and dairying, and Agricultural Engineering, and minors in Biology, Chemistry, Physics, and Economics. An annual scholarship of \$800 has been provided to enable a promising student each year to study abroad for at least two years, depending upon the progress made. During the academic year 1921-22, four graduates in agriculture from this institution were pursuing post graduate studies in American universities and five here. This year four are away and seven at home.

PART I

Dominion Department of Agriculture

DOMINION EXPERIMENTAL FARM SERIES

THE CAP ROUGE EXPERIMENTAL STATION

BY GUS. LANGELIER, SUPERINTENDENT

THE Cap Rouge Experimental Station was established in January, 1911, to help solve some of the problems of the farmers, breeders and horticulturists of Central Quebec. It is situated on a good macadam road, some eight miles west of the city of Quebec, and comprises 425 arpents or about 350 acres, two-thirds of the area being under cultivation.

Everything done at Cap Rouge converges towards experimental work. This work is divided into three main branches: agriculture, live stock, horticulture.

Agriculture

The work pertaining to agriculture comprises soil and crop management, soil fertilization, and the testing and breeding of forage plants and cereals.

Soils and Fertilizers.—One of the important projects in soil management is a comparison of summer, autumn and spring ploughing for silage corn. The season is short in Central Quebec and when there is a lot of spring ploughing to be done, some of the other work is liable to be delayed. A few more years will give interesting data in regards to this question.

The part played by tilth, also by organisms will, with time, receive attention, whilst farm manures, green manures, chemical fertilizers, and lime have been looked into to some extent. One of the main projects in this connection is a comparison of burnt lime with ground limestone. This is an important one anywhere, and especially so in a

district that is the oldest one in cultivation in Canada.

Crop Management.—The following projects are receiving, or have received, careful attention: cost of production of field crops; comparison of different rotations; planting corn for silage in drills or in hills; rates of seeding oats; comparison of corn, sunflowers, peas and oats for silage; rates of seeding timothy and red clover; yield of clover hay after different rates of sowing oats, and also after different kinds of nurse crops. A very interesting study is made of the cost per ton of digestible nutrients in timothy and clover hay compared with corn silage and with swede turnips. The results of ten years of careful work on a very large scale—all cost items having been recorded and all crops weighed on over 500 acres—show that succulence plays an important role. It should not be overlooked, however, that it costs from two to three times more for a ton of digestible nutrients in corn silage and swede turnips than it does in hay.

Forage plants and cereals.—Hundreds of varieties and strains of grasses, clovers, corn, roots, wheat, barley, oats, peas have been tested and a large number discarded because they were practically identical with existing varieties, or they were not adapted to the conditions of the district. A certain number have been found to be leaders in their respective classes, such as Longfellow corn for silage, Quebec Yellow corn for grain, Good Luck swedes, Huron wheat, Manchurian barley, Banner oats, Arthur

peas. In every case, an attempt has been made to select strains of each of these varieties which would do especially well in the district, and good success has been obtained, especially with Huron wheat and Manchurian barley, as the Cap Rouge selections have outyielded not only the parent varieties but also every variety of the same kind of grain that was tried at the Station.

Live Stock

Live stock is mentioned after agriculture proper as every farmer should concern himself with producing good crops before undertaking to improve live stock.

Joachim, on an electric car line, twenty-five miles east of Quebec city. French-Canadian horses are used for experimental purposes, but also with the avowed object of rejuvenating this best of all general purpose breeds. Some ninety head are kept at present and over thirty mares, all registered, are due to foal in 1923. Different methods of breeding—close, in line, or outcrossing—now constitute the main project, though experiments relating to feeding, housing and management have received attention. All these horses, including weanlings, with the exception of the few mares kept for work, are wintered



Trial Plots at Experimental Station, Cap Rouge, Que.

Of course, if the two things are done at the same time, so much the better, but it is a great mistake to try and improve live stock on a neglected farm where crop yields are poor. At the Station, work with live stock is now confined to horses, cattle and poultry, and experiments are conducted, or have been conducted, in the breeding, feeding, housing, and management of each class of the above named.

Horses.—The Superintendent of the Cap Rouge Station is also superintendent of the largest horse farm east of Manitoba. This farm is situated at St.

in open-front, single-boarded sheds, and there is no sounder or hardier bunch to be seen anywhere.

Cattle.—The herd of French Canadian cattle at Cap Rouge, numbering about sixty head, is acknowledged to be the best in existence, from the point of view of production. The two-year, three-year and four-year-old champions in Record of Performance are all in the same stable, and it is the exception rather than the rule, for a heifer to fail to qualify for Record of Performance with her first calf. In breeding up this herd, the main lessons learned were that

THE AGRICULTURAL GAZETTE OF CANADA

it is no use to try and do anything if the stock is not kept perfectly healthy, and that the use of bulls out of heavy producers is absolutely necessary to increase the average milk yield of a herd. Amongst the projects receiving attention are a comparison of whole milk with skim milk and substitutes for raising calves; the food requirements to rear heifers until of milking age; heavy versus light grain feeding for winter production; wintering stock in single-boarded open-front sheds; extra good versus poor rearing of heifers as influencing the type and production of the mature cow.

bird was used if not out of a hen with a yearly production of at least 150 eggs, but the minimum requirement is now 200 eggs. This pedigree work is interesting not only from the point of view of trying to breed up the Cap Rouge flock of Barred Rocks, but also from the general point of view of genetics. Amongst the feeding projects, all for winter egg production, which received attention for five years, are a comparison of commercial grain with screenings; roots with clover; skim milk with beef scraps; water with snow. A comparison is now being made between commercial and home-grown feeds. An investigation



A large number of varieties of fruits, vegetables and ornamental plants are tested at the Cap Rouge, Que., Experimental Station.

Poultry.—A flock of about 300 Barred Rocks is kept during winter, and about 750 chicks are hatched annually. As it has been proven by a careful experiment of five years' duration that early pullets are the most economical winter layers, only 100 hens are kept over, while 200 pullets are added each year. With the aid of trap nests, wire-covered trays in the incubators and sealed wing bands, pedigree breeding is conducted so that any bird's ancestry can be traced at any time. When starting this work four years ago no male

was made as to the fluctuations of temperature in houses of different widths, from the colony house, 8 feet wide, to the permanent structure of 16 feet, and it was found that it is more stable in the latter.

Horticulture

A great deal has been done with fruits, vegetables, and flowers as there are a very large number of people interested in these in a district such as this, where there are two fair sized cities and a number of smaller industrial centres,

and the production of fruits, vegetables and flowers is an important industry. For this reason much attention has been given to horticulture. The main phases of the work have been testing and breeding varieties and strains and cultural experiments.

In connection with fruit, attention is given chiefly to apples, plums, strawberries, raspberries, currants and gooseberries, but there are also projects relating to cherries, pears, and grapes. Over 200 varieties and strains of fruits have been and are being carefully tested, with the result that the following may be recommended for the district: apples, Yellow Transparent, Duchess, Wealthy, from summer to mid-winter; black currants, Climax; gooseberries, Silvia; strawberries, early Excelsior, mid-season, Dunlap; raspberries, early King, mid-season, Herbert. A few selections and seedlings, especially of black currants and strawberries, are very promising. Amongst the important projects with fruits may be mentioned a comparison of different cover crops for apple orchards, also the cost of es-

tablishing an orchard of McIntosh apples with Wealthy as fillers.

Practically every vegetable of any importance to the district has received attention, such as asparagus, beans, beets, cabbage, cauliflower, celery, corn, cucumber, muskmelons, onions, parsnips, peas, potatoes, pumpkins, rhubarb, squash, tomatoes, turnips, watermelons. An idea may be had of the scale on which variety testing has been conducted from the fact that of one kind of vegetable only, the tomato, seventy-six strains or varieties were tried. Plant breeding has been very successful, especially with asparagus, beans, beets, cabbage, corn, parsnips, peas, potatoes and tomatoes. Cultural experiments were made with thirteen of the above named vegetables, and some of these projects are still going on.

Over 600 varieties of trees, shrubs, perennials, annuals, and bulbs have been tested, and many have been eliminated because they were not hardy enough or not as attractive as others of the same size and season.

THE MEAT AND CANNED FOODS INSPECTION SERVICE

BY ROBERT BARNES, V. S., Chief MEAT AND CANNED FOODS DIVISION

PUBLIC health demands purity of food products, and the procurement and maintenance of a wholesome and hygienic food supply is unquestionably one of the most important subjects with which the sanitarian has to deal. Disraeli once remarked that the happiness of a nation depended upon the health of the people. The statement is as significant to-day as it ever was. One of the most encouraging present day developments is the awakening of the health conscience, so to speak. But no matter how alert, well informed and prudent the individual may be, he is no longer able to protect unassisted

his own health or that of his family from some of the most serious dangers that threaten it through eating food of an unwholesome nature, and it is only by the aid of the strong arm of the law acting through public officers concerned in matters of this nature that he is protected.

The knowledge authentically established that many of the animal diseases are communicable to man compels us to recognize the urgent demand for the eradication of disease among domestic animals, and the safeguarding of public health by insisting on meat that is sound, wholesome and absolutely free from disease.

The traditions of the oldest civilized nations show regulations governing the inspection of foods. That such is the case is evident from the history of the Egyptians, the Israelites, Phoenicians, Babylonians, and Athenians; and we are credibly informed that in Alexander the Great's time rather drastic measures were adopted in an endeavour to protect the consumer.

Meat and Canned Foods Act

In Canada, so far as Federal legislation is concerned, such measures are comparatively new, being in existence but 15 years, or since 1907, when *The Meat and Canned Foods Act* was placed on the statute book. This Act is probably as far-reaching and as authoritative as any at present in force.

The Act and the regulations thereunder provide at the present time for the inspection and certification of all meat and meat food products, canned and preserved fruit, vegetables, fish, and milk condensed, evaporated or otherwise preserved for food, and for the supervision of all establishments engaged in the preparation of such products. The division of the Health of Animals Branch of the Dominion Department of Agriculture having charge of the work is known as the Meat and Canned Foods Division. Federal authority appears to be limited however by the Act of Confederation to the examination and control of such products only as are destined for export or for inter-provincial trade. When an establishment is placed under inspection, the officers of the Department take entire control as far as all food products handled are concerned, both as regards examination for wholesomeness, sanitary handling during the course of preparation, and proper labelling of the finished product.

Meat Inspection

As a result of fifteen years work in connection with the phase of inspection relating to meat, many conditions and diseases which entail an enormous

loss to the country have been discovered. Probably ninety-five per cent of the diseases and conditions for which condemnations are made in the public abattoirs are preventable.

On an analysis of 1,500 cases of tuberculosis in children, it was demonstrated that seventy-five per cent of gland tuberculosis is of bovine origin; sixty-six per cent of generalized tuberculosis is bovine; some eighteen to twenty-six per cent of deaths from tuberculosis are caused by the bovine bacillus. Bovine and human tuberculosis germs are separate and distinct organisms. The bovine organism can and does cause disease in the human being to an alarming extent. To the children especially it is a real menace. By wiping out the tuberculous cattle throughout the country the lives can be saved and the health impairment prevented of thousands of boys and girls.

When meats or meat food products have finally passed the course of inspection, they are marked with a circular stamp bearing the words "Canada Approved" and a crown in the centre, and also the number of the establishment. By this means a quarter of beef, no matter where found, can be identified by the number as having been slaughtered at a particular plant. Unless the meat placed upon the market bears this stamp, there can be no guarantee as to its wholesomeness or fitness for food.

Inspection of Fruits, Vegetables, Milk, etc.

In connection with the canning of fruits, vegetables, milk, etc., every phase of this work was carefully gone into, with the result that the Branch was confronted with the necessity of taking some definite action for the protection of purchasers of foods contained in packages where the contents was not visible until the container was opened. To this end standards of quality for canned fruits and vegetables were adopted, whereby the producer, manufacturer and consumer would be protected. It is be-

lieved that Canada was the first country to put into effect such advanced legislation. In this we were followed almost to the letter by the United States, where the largest packing corporation in the world has adopted our nomenclature and our standards.

To-day a number of canning firms are buying their raw material on a quality basis, and it is believed that the excellence of their products will result in greatly increased demand both for home consumption and for export. In order that the export markets may be obtained and held, no consignment of these products may leave Canada without supervision and certification by officers of The Meat and Canned Foods Division. All establishments engaged in an export trade are numbered, and the number must appear on the package. It is therefore quite easy, should complaints be received, to determine the factory responsible. In order that Canadian producers may not be subjected to unfair competition, it is required that imported products conform to Canadian standards.

A few years ago immense quantities of peas were imported from France which were small, tender, and of a beautiful colour. The colour was obtained by the addition of sulphate of copper. That trade is now a thing of the past, as goods rendered attractive by the addition of colouring material are barred

from entry into Canada, while their manufacture in Canada is prohibited. Formerly dishonest methods were also rife in connection with the canning of tomatoes. The honest packer could not compete with those who would place in the can a few skins, seeds and water. To-day such products may not be manufactured nor imported.

The canning of foods, or the method by which foods may be preserved through the application of heat, is no secret; our grandmothers long ago learned the art. That art has been improved by the building of proper premises, and the introduction of mechanical equipment, etc., to the extent that the manufacturer can to-day produce and place on the market as good or better products for less money than can be produced in the household.

The number of canning factories at present operating in Canada is sufficient to take care of, during the season of plenty, vast quantities of foods, essential to our growth and development, for use at seasons of the year when fresh products are unobtainable or where conditions render them difficult to procure in the fresh state. Now that Government supervision is exercised over their preparation, canned goods may be purchased with the full assurance not only that they are wholesome but also that the goods contained in the package are of the class and quality represented.

THE MARKETING OF CANADIAN FRUIT AND VEGETABLES

Measures Adopted to Bring About Improved Conditions, and the Part Played by the Fruit Branch in Connection Therewith

BY G. E. MCINTOSH, COMMISSIONER

WHILE fruit growing was a well established industry in the older provinces of Canada 25 years ago, the trade, particularly for export, was in a most unsatisfactory state owing to lack of packing and

grading regulations. At that time certain commercial standards were used which varied with the season and the individual judgment of the packer, and as a result all grade marks had become meaningless to the trade. Over-

facing was also a common practice. The returns from apple sales in Great Britain reflected the lack of confidence felt by buyers in Canadian packs.

Realizing that as production increased and distribution extended, standardization of packages and uniform grading regulations were necessary if the fruit industry was to be permanently successful, the Department encouraged this marketing necessity, and as a result *The Fruit Marks Act* was passed in 1901, the Bill being introduced by Senator E. D. Smith, a well known shipper of the Niagara district. The Act made it compulsory for all fruit packed in a closed package intended for sale to be marked with the name and address of the packer, the variety of fruit and the designation of grade, the grade mark used being optional with the packer. It also provided a penalty for overfacing.

The Fruit Marks Act has been amended from time to time to meet the growing needs of the industry, and the evolution of the Act is practically the history of standardization so far as the fruit industry of Canada is concerned. The Act now specifies all grade marks that may be used, defines the grades, contains regulations with respect to imported fruit, the filling of packages, and the sale of immature or decayed fruit. It also applies to open as well as closed packages, and provides standard packages for practically all kinds of fruit grown commercially in Canada. The specifications for these packages having been carefully worked out by growers, package manufacturers and representatives of the Fruit Branch. Previous to the standardization the multiplicity of packages in use created unfair competition as well as being deceptive to the consumer.

Immediately after the passing of the Act it became evident that some machinery would be provided for its enforcement. The Minister of Agricul-

ture therefore organized the Fruit Division. With eight inspectors in the fall of 1901; the inspection service has developed at the request of the industry until, during the season of 1921-22, over sixty inspectors were employed, working almost entirely among the growers and packers, not only inspecting the fruit as it was packed, but also giving instructions in the best methods of picking, packing, grading and shipping. In 1901-02, 814 inspections were made, while in 1921-22 the staff inspected 21,473 shipments.

The first power spraying demonstrations in Eastern Canada were arranged by the Fruit Branch twenty years ago, and since then the Branch has co-operated with the provincial departments of agriculture in all educational work leading to improved orchard practice and to better methods of picking, packing, storing, and loading fruit.

Packing demonstrations with all kinds of fruit and all varieties of packages have been part of the work of the Branch since its inception. In 1904 the Department arranged for a western box-packer to introduce that method of packing in Eastern Canada. Such demonstrations have been continued from time to time until a fair proportion of the eastern crop is now being boxed, although the barrel continues to be the popular container in that territory.

Another factor in successful marketing is reliable information as to source of supply and market conditions. Owing to the perishable nature of fruits, it was recognized that crop estimates and market intelligence should be included in the activities of the Branch. In 1905 the distribution of a Monthly Crop Report was commenced, showing conditions in the commercial fruit districts, crop prospects and market values in Canada and competing countries. This bulletin also includes notes on transportation matters and other items affect-

ing directly or indirectly the marketing of fruits and vegetables.

Since 1914 a Telegraphic Market News Letter has been issued semi-weekly throughout the marketing season. This is published simultaneously at Middleton, N.S., Ottawa, Ont., Winnipeg, Man., and Vancouver, B.C. It contains prices telegraphed by members of the staff in the marketing centres from Halifax to Vancouver and, during the export season, the prices paid on the large markets of the United Kingdom as cabled direct by the Canadian Fruit Trade Commissioner in Liverpool; also the wholesale markets in several large centres of the United States.

The necessity for a special Fruit Trade Commissioner in Great Britain was urged by the Fruit Branch for many years. The appointment was made in 1916, and the result has been that Canadian exporters have secured unprejudiced criticism and valuable information as to the best method of meeting the market requirements of the United Kingdom and Europe.

To deal with the many complex problems arising in connection with both domestic and export transportation, a transportation division was added to the Branch in 1917, with the result that the co-operation of the carrying companies was secured in improving the service for the transportation of fruits and vegetables. There has been a gradual evolution of transportation facilities during the past few years which has made possible the distribution of the Canadian fruit crop from the producing centres to the most distant markets, thus in a measure keeping pace with the development of the industry. Special experiments have been made to determine the proper types of cars to be used under refrigeration, ventilation and heating; the proper method of loading cars, and the best method of handling in transportation the different kinds of fruits.

Valuable information has been gathered and many improvements have been brought about by the co-operation between this division and the carriers.

With the improvement in grading, packing and marketing, due to the enforcement of *The Fruit Marks Act*, with the development of co-operative packing and marketing, which enables large lots of uniform quality, grade and variety to be placed on the market, and with the advancement made in transportation conditions, the commercial fruit industry in Canada is in good shape to face the period of general trade depression which is the result of reaction after the war years.

The Fruit Branch has encouraged the establishing of pre-cooling plants in producing districts for handling tender fruits. This together with the results of experiments in handling field fruit in refrigerator cars has made it possible to move safely British Columbia fruits of all kinds as far east as the Atlantic Coast, while Ontario berries, peaches and other soft fruits are being landed in perfect condition on the Prairie markets.

LEGISLATION

- 1901—*The Fruit Marks Act* passed requiring name and address of packer, the variety of the fruit and a grade mark to be placed on every closed package of fruit packed for sale, and that the face or shown surface be a fair representation of the contents of the package. Grade marks to designate the quality of the fruit were optional.
- 1902—Act amended providing grade marks No. 1 or "XXX" and No. 2 or "XX" and No. 3 or "X." The first quality only was defined.
- 1906—In the revised Statutes of Canada *The Fruit Marks Act*, together with other Acts relating to fruit and fruit packages, was codified as Part IX of *The Inspection and Sale Act*.

1907-8—The Act was amended limiting the grade marks that might be used to numerals, No. 1, No. 2 and No. 3. The No. 2 grade was defined. The use of a "Fancy" grade was also permitted, this grade requiring practically perfect fruit.

1913—An amendment was made covering the application of the Act to imported fruit, the kinds of fruit to which it was applicable to be prescribed by the Governor in Council.

1918—Amendments were made eliminating the Fancy grade, which had proved impracticable, and providing for a "Domestic" grade in addition to No. 1, No. 2 and No. 3. Provision was also made for the marking of open packages with the name and address of the packer, the proper marking of repacked fruit and of packages used a second time; it was also made an offence to pack immature fruit of certain specified kinds, and diseased fruit. A provision was also made requiring that fruit packages must be well and properly filled at shipping point. The regulation with respect to over-facing was also made more stringent and standard packages were prescribed for practically all fruits grown commercially in Canada.

1920—Further necessary amendments in connection with packages were adopted.

1922—In recognition of a widespread demand from the potato and onion industries for grading legislation, the Department arranged a conference of representatives of those industries to meet in Ottawa in February, 1920, to consider the advis-

ability of providing Federal grades. Recommendations were made by the Conference with respect to the grading and marking of these products and the sale of vegetables by weight, and *The Roots Vegetables Act*, prepared in accordance with the wishes of that conference, was passed by Parliament in June, 1922. This legislation has been placed with the Fruit Branch for enforcement.

NOTES

In 1901 the Fruit Division was organized as a branch of the Commissioner of Agriculture, with W. A. McKinnon as Chief from 1901 until his resignation in July, 1904.

Alexander McNeill, Chief from July, 1904, until his death, December, 1913.

On May 1, 1913, the Division was raised to the status of a Branch, with Donald Johnson as Fruit Commissioner until his death in August, 1918.

From November, 1918, until his resignation June 1, 1922, C. W. Baxter was Fruit Commissioner.

Geo. E. McIntosh, Transportation Specialist of the Branch, was appointed Fruit Commissioner in August, 1922.

Dominion Fruit Conferences have been held under the auspices of the Department as follows:—

Second Dominion Fruit Conference, March 20-22, 1906, Ottawa.

Third Dominion Fruit Conference, Feb. 14-16, 1912, Ottawa.

Fourth Dominion Fruit Conference, Sept. 3-4-5, 1914, Grimsby.

Fifth Dominion Fruit Conference, Mar. 26-27, 1918, Ottawa.

Sixth Dominion Fruit Conference, Feb. 22-24, 1922, Ottawa.

PART II

Provincial Departments of Agriculture

THE AGRICULTURAL INSTRUCTION GRANT IN BRITISH COLUMBIA

Summary of Activities, 1913-1922

I. THE DEPARTMENT OF AGRICULTURE

THE allotments to the Province of British Columbia during the nine years, 1913-22, under the provisions of the Agricultural Instruction Act have been as follows:—

1914, Fiscal year ending March 31	\$ 47,334 76
1915 " " 31	52,799 38
1916 " " 31	58,265 94
1917 " " 31	63,732 50
1918 " " 31	69,199 06
1919 " " 31	69,199 06
1920 " " 31	69,199 06
1921 " " 31	69,199 06
1922 " " 31	69,199 06
Total	\$568,127 88

From the above grants annual allowances have been made to the Department of Education *re* elementary agricultural instruction in schools, amounting to a total of \$136,000 in the nine years.

The University of British Columbia at Vancouver has also received the following amounts:—

Year 1918-19	\$ 8,000
" 1919-20	12,000
" 1920-21	20,000
" 1921-22	23,000
Total	\$63,000

The sums available through the Act have enabled the Department of Agriculture to function to a much fuller extent than would have been possible if provincial appropriations only had been relied on. Valuable lines of education and demonstration work have been carried on to instruct the farmer how, by the adoption and application of correct principles, production from the land and

quality of stock could be improved, thus giving a stimulus to agriculture.

The following is a summary of the chief lines of work taken up under the Act by the Department of Agriculture:—

Agricultural Journal and Publications Branch.—In March, 1916, the first number of *The Agricultural Journal* was issued, all Farmers' Institute members being placed on the mailing list.

The Journal, which is published monthly, has timely articles on fruit growing, stock raising, dairying, poultry work and other phases of farming. It also contains a record of Farmers' and Women's Institute work, and of the horticultural investigation and demonstration work carried on by the Department. Its aim is to help the farmer to secure better results by encouraging breeding from selection and correct methods of field and orchard practice.

Reports on Field Crop Competitions, Boys' and Girls' Clubs and several circulars dealing with activities of officials working under the Act have also been published.

Alfalfa Plots (1915-1917).—Twelve plots of one acre each were established at coast and interior points to demonstrate the suitability or not of this fodder crop. Very valuable data were gathered and considerably increased acreage in interior districts has followed the published reports of the Department.

Beekeeping (1914-1921).—Owing to the increase of foul-brood in certain districts in the province, seasonal inspectors were appointed from the year 1914 with locations in the Kootenay district, Okanagan and dry belt, Lower Mainland and Vancouver Island. Demonstration and instruction work was carried on co-incident with inspection, and better and up-to-date methods of beekeeping were advocated.

In 1920, the number of inspectors was increased to 7; the outbreak of European foul-brood being alarming in the Lower Fraser Valley where four inspectors were allotted.

In 1921, 28 demonstration apiaries were established in various beekeeping sections of the province; whilst outdoor demonstrations, lantern lectures, judging honey at fall fairs, and the supervision of honey exhibits at coast exhibitions were also part of these inspectors' work.

Boys' and Girls' Clubs and Field Crop Competition (1915-1922).—In 1915, juvenile competitions were placed on an organized basis, and a bulletin was issued with cultural hints, rules and regulations. Instructors and judges were appointed, and the awards were based on three scores, field, harvested product and a financial statement. Prize-winning exhibits were made at seed fairs and the larger provincial fairs.

By 1917, the competitions organized in potato and corn growing, pig, poultry and calf rearing, were taken up by 20 clubs. This year (1922) 23 clubs have been formed, with a likely total of 30.

Cow-Testing Associations (1913-1922).—These associations were inaugurated in 1913, the first ones being at Chilliwack with 1,080 cows, Comox valley with 460 cows, and Langley-Surrey with 420 cows. The Department guaranteed the tester's salary.

The weighing of milk and the use of the Babcock test have resulted in the discarding of many unprofitable cows, whilst encouragement has been given to breeding from selection, balanced rations, proper housing, etc. There are now five active associations in the province.

Demonstration Dairy Farm Work (1913-1914).—Two veterinary surgeons were appointed specially to inspect dairy farms and advise owners on the production of pure milk.

Prizes were given for milk and cream competitions at fall fairs and awards made for the best equipped and conducted plants. Official tests of pure-bred herds were also conducted.

Dry Farming Demonstration Stations (1917-1921).—In 1917, two dry farming stations, established in 1913 by the Lands Department at Quilchena in the Nicola district and at 105 Mile House in Northern Lillooet, were taken over by this Department, current outlay being charged to the Grant. Extensive experimental work had been carried out by the Lands Department previously in connection with the growing of grains and grasses under dry land conditions. On taking over by this Department it was thought advisable to endeavour to make these farms more self-supporting by the production of live stock. Fodder crops were accordingly raised at both stations and flocks of sheep purchased, wool and lambs being sold. A number of horses were also bred and sold.

Various potato experiments were conducted at Quilchena, but, owing to adverse weather conditions, grain and fodder crops had to be cut for hay in several seasons. A very unsuccessful year was experienced at Quilchena in 1920 owing to the prevalence of grasshoppers, and the station was closed down in September, 1921.

At 105 Mile, various experiments were conducted with wheat, rye, oats and barley. The station not apparently serving any useful purpose was closed down in 1920.

Drainage Work.—In 1917, two ditching machines were purchased and operated to give instruction with regard to the value of drainage.

Pitt Meadows Demonstration Plot (1916-1921).—In 1916, a plot of ten acres was taken over in the Pitt Meadows district, an area under dykes, and tile drains were installed. The land was then manured and limed and divided up into plots during succeeding years. Experiments in oats, wheat, barley, corn, carrots, mangels, and potatoes were carried out. The resulting data are of value to farmers on an area of thousands of acres, which although protected by dykes, requires drainage and special rotation of crops.

Farm Demonstration Stations (1914-1917).—In 1914, six stations to demonstrate systems of cropping were located in the interior of the Province, land of poor average quality being chosen. An endeavour was made to restore the land to profitable production by methods within the reach of the average farmer; a committee of the local Farmers' Institute co-operated in an advisory capacity. These stations were increased to 12 in 1916, the six additional ones being located in Northern B.C., along the line of the Grand Trunk Pacific. Interesting records as to the suitability of certain varieties and of crop yields were obtained, although the closing of the

northern stations after two years' work made definite data impossible.

The stations were reduced to 8 in 1917 and closed down at the end of that season.

Farmers' Institutes (1913-1914).—An elaborate series of two or three day short courses was arranged to include 95 Institutes; demonstrations in live stock and horticulture being a feature.

Field Crop Competitions (1912-1918).—These were commenced in 1912, when 14 Farmers' Institutes competed, the peak being reached in 1915, when 101 competitions were organized with 812 entrants. A bulletin of instructions and regulations was issued each year. The minimum size of plots was half an acre, and the awards were based on a field score. Considerable improvement in the potato and root crops of the Province resulted.

The year 1918 was the last for these competitions to be organized on a large scale with provision of instructors, judges and prize money. Judges are now supplied only on request to individual Institutes arranging for a competition.

Horticultural Demonstration Work (1913-1922).—One of the earliest activities under this section was the establishment of five-acre demonstration plots in Northern B.C., at Lawn Hill on Graham Island, at Bella Coola on the Mainland coast and at Terrace on the Skeena river. These were worked under the supervision of a horticulturist stationed at Prince Rupert. Important investigations in drainage, fertilizers and general crops, in addition to strictly horticultural work, were carried out during the years 1913 to 1917, when these plots were closed down owing to depletion of the staff from war duties. At Terrace, in particular, the work carried out in strawberry culture laid the foundation for an industry which began to produce on a car load scale in 1921.

In 1917, work was carried on at Hatzic in connection with the testing of varieties of strawberries on a commercial basis. Shipping tests were made and valuable information was given.

Fruit Packing Schools and Competitions (1913-1922).—Fruit Packing Schools have been held annually, competent instructors being engaged to supplement the regular staff. Especially good work has been done in outlying districts, such as the Kootenay, in instructing small growers who pack their own products. Prize money for competitions of pupils at fall fairs was also a feature for some years. In 1921, 8 schools were held with 99 pupils, and in 1922, 11 schools with 116 pupils.

Pruning Schools (1913-1922).—These have been an annual feature since the inception of the grant, every fruit growing district in the Province having received benefit from this important work. In this case also extra instructors are engaged where the horticultural staff could not handle the applications. Total Pruning Schools in 1921, 40; pupils, 441.

Experimental Work in Vegetable Growing and Greenhouse Work (1914-1917).—A ten-acre plot was operated at Summerland in the Okanagan valley during this period, cultural methods and varieties of early vegetables suitable for the Okanagan being demonstrated. In 1917, fifteen different crops of fruit and vegetables were grown, the gross return being \$7,195.10 and expenses \$2,237.85. This project was run as a demonstration by a farmer rather than as a government demonstration station. The example given of successful early culture of vegetables in particular has been largely followed at Summerland and in the adjacent districts of the Okanagan, and good markets have developed.

Strawberry Demonstration Work (1919-1922).—A demonstration strawberry plot was established on a six-acre lot at Gordon Head on Vancouver Island

in 1919 in order to demonstrate the possibility of building up and improving an impoverished strawberry soil badly infested with the strawberry-root weevil. A six-year rotation was decided upon, the land put into shape and a weevil barrier built around one acre.

Cover Crop Demonstration (1919-1921).—Four plots of 2½ acres sown to winter vetch and sweet clover were operated in the West Kootenay and Okanagan districts to demonstrate to local fruitgrowers the value of nitrogenous annual cover-crops.

Anthraco-nose Control on Vancouver Island (1916-1920).—A series of experiments in experimental spraying for the control of the above disease on apple trees has been carried out near Victoria.

Apple Scab Experiments (1919-1920).—These were carried out in the West Kootenay and Salmon Arm districts.

Liming Experiments (1918-1920).—These were made at Salmon Arm.

Market Work (1915-1918).—With the object of assisting British Columbia producers to secure the best market for their produce and to supply information as to conditions, prices, grading, etc., a Coast Markets Commissioner was established at Vancouver. Weekly reports were sent to many hundreds of producers and the activities of the branch were responsible for the better marketing of much produce and the saving of considerable money to producers.

In 1917, this office undertook the inspection and issuing of certificates in connection with potato exports, good work being done in raising the standard of commercial shipments.

(The work of this branch was charged to Provincial funds from August, 1918.)

Noxious Weeds.—In 1915 *The Noxious Weeds Act* was revised and provision made for the employment of several seasonal inspectors. Good work was done of an educational nature

THE AGRICULTURAL GAZETTE OF CANADA

amongst the farming community on methods of control, and lists were compiled showing the prevalence of certain weeds in different districts, which were a basis for further control work.

Pathological and Entomological Work.—In 1916, laboratories at Vancouver and Vernon were established and equipped in connection with investigation and research work in plant diseases and pests. One, and later, two Assistant Plant Pathologists and Entomologists were appointed. Since 1917 a good deal of the time of the Vernon office has been taken up in connection with codling moth investigation work in conjunction with the local staff of the Dominion Entomological Branch and Provincial horticultural staff. Studies of the life history and control of the onion maggot and cabbage root maggot were also important lines in 1920-21.

Potato Work.—In 1917, late blight of potatoes was very prevalent in the Lower Fraser valley, and experiments were undertaken on four plots in the Cloverdale and Surrey districts. Spraying machines were bought and considerable work was done in drawing attention to the necessity of control methods for the improvement of crop yield. The work was carried on through the seasons of 1918-1921.

Poultry Work (1913-1922).—The improvement of poultry in outlying sections of the Province was aided by establishing poultry-breeding stations in 1913 to 1917, the Department supplying the stock, and the breeder guaranteeing to supply settings of eggs locally at a minimum price. Very good work was accomplished in developing good laying strains of strictly utility quality.

International Egg-Laying Contest.—This contest, open to the world, was the first to be held under official auspices on the American Continent.

Forty pens competed with 6 pullets to a pen. Valuable data have been collected on rations, laying qualities and strains. Refunds from the sale of eggs make the contest self-supporting to a certain extent.

Seed Distribution.—A "better seed" campaign was organized in 1915, and the following seed distribution was made through farmers' organizations:

Oats. (2 varieties)	119,300 lbs
Wheat.	17,000 "
Corn. (3 varieties)	7,255 "
Mangel. (from Denmark) .	2,240 "
Alfalfa. (2 varieties)	2,800 "

There were over 1,100 applicants for the alfalfa and corn alone. Valuable data were secured from reports at the close of the season.

The distribution was continued in 1916, the results in increased acreage and yield per acre being noteworthy.

Seed cleaning, etc.—In 1916, a clover and alfalfa huller was purchased and operated by the Department to encourage farmers to produce the highest quality of seed at home. The seed from over 200 acres was threshed the first year, a nominal price being charged for the service.

A Clipper Seed Cleaner was purchased and demonstrations given in 11 districts, between 50 and 60 tons of seed being cleaned.

Seed growers' directories have also been compiled.

Seed Fairs.—In 1916 seed fairs were held at Armstrong and New Westminster. Prizes were given by the Department, and all expenses in connection with transportation, etc., were paid. These fairs have become annual events.

Co-operative Variety Testing, 1916.—Wheat, Oats, Barley, Corn, Potatoes, Flax, Beet.—One thousand seven hundred and fifty-seven samples weighing

THE AGRICULTURAL GAZETTE OF CANADA

15,291 pounds were distributed. Reports as to quality, market, suitability and disease resistance, etc., were received and much valuable data accumulated.

Silo Demonstration Work.—This was commenced in 1914. Five silos were built and filled by the Department in districts where silos were unknown. A cheap but efficient type of stave silo was standardized and the farmers were encouraged to build same, blue prints and specifications being supplied. In 1916, it was estimated that 300 silos had been built by farmers as a direct result of this campaign and, by 1917, 500 silos had been built.

This work was continued to include the season of 1920, attention being given more to the construction of silos in Northern B.C. Afterwards demonstration fillings continued to be given in several districts. Sets of silo forms for cement silos were also purchased and loaned to farmers. By the close of 1920, 63 silos had been built by the Department and 51 filling demonstrations given by department-owned cutters and fillers.

Women's Institutes (1913-1914).—Competent lecturers in dressmaking and cooking visited all the Women's Institutes (25), the courses lasting two weeks. The demonstration work was highly appreciated.

SUPPLEMENTARY OFFICERS EMPLOYED UNDER THE PROVISIONS OF THE AGRICULTURAL INSTRUCTION ACT, YEARS 1913-1922

Position	1913 to 1914	1914 to 1915	1915 to 1916	1916 to 1917	1917 to 1918	1918 to 1919	1919 to 1920	1920 to 1921	1921 to 1922
	No.	No.	No.	No.	No.	No.	No.	No.	No.
Assistant Horticulturists.....	5	2	4	3	1	.....	1	.....	.....
Assistant Plant Pathologist.....	1	1	1	1	1	1	1	.....	.....
Assistant Soil and Crop Inspector.....	1	.....	1	2	1	1	.....	.....	.....
Agriculturist.....	1	1	2	3	3	1	1	.....	.....
Silo Demonstrator.....	1	.....	1	1	1	1	1	.....	.....
Veterinary Inspectors.....	2	2	.....	.....	.....	.....	.....	.....	.....
Secretary, Women's Institute Advisory Board.....	1	1	.....	1	1	.....	.....	.....	.....
Noxious Weed Inspectors.....	.....	.....	7	.....	.....	.....	.....	.....	.....
Markets Commissioner.....	.....	.....	.....	1	1	.....	.....	.....	.....
Editor.....	.....	.....	.....	1	1	.....	.....	.....	.....
Foreman, Dry Farms.....	.....	.....	.....	.....	2	2	2	1	1
Cow Testers.....	.....	.....	7	5	7	4	7	5	5
Foul Brood Inspectors.....	.....	3	3	.....	3	3	.....	6	4
Potato Inspector.....	.....	.....	.....	.....	1	.....	.....	.....	.....
Poultryman.....	1	1	1	1	1	.....	1	1	1
Assistant Entomologist.....	.....	.....	.....	.....	.....	1	1	2	3
District Field Inspector.....	.....	.....	.....	.....	.....	1	2	.....	.....
Buttermakers.....	.....	.....	.....	.....	.....	.....	.....	2	.....
Total.....	13	11	27	19	24	16	17	17	14
Total number of officers of Department paid from Provincial Votes.....	35	45	45	47	44	48	50	74	75

II. ELEMENTARY AGRICULTURAL EDUCATION

By J. W. Gibson, Director

IN the year 1913-14 approximately \$1,000 was expended under the direction of the Advisory Board of Women's Institutes in co-operation with the Department of Education in introducing school gardens. During that year 17 institutes made application for

school garden seeds and altogether about 40 schools established small flower or vegetable gardens, a promising beginning.

In 1914, a provincial director was appointed under the Department of Education and a scheme of work decided

upon which included (1) the holding of special summer courses for teachers in agriculture and related subjects; (2) the allowing of bonus grants to teachers undertaking agricultural instruction through school and home gardening, or other home projects in agriculture; (3) financial assistance to all school boards undertaking to carry out an approved scheme of agricultural instruction through school and home gardening; (4) the placing of agriculture as an optional subject in high schools, a two-year course, valid for matriculation credit to be established in such schools as could arrange to have the services of a qualified instructor; (5) the appointing of District Supervisors of Agricultural Instruction whose duties would include the teaching of agriculture in the public and high schools of their respective districts; exercising a general supervision over the teaching of nature study and elementary agriculture in those districts and helping the teachers to formulate and carry out such courses of instruction in those subjects as were best suited to the districts; conducting high school extension classes in agriculture during the winter months for the benefit of young men and women not attending high school; giving practical advice and assistance generally to the pupils out of school and to adult members of the community in all matters pertaining to local rural problems, including the organizing of agricultural clubs, school and community social functions, sports, etc.

The first District Supervisor was appointed in 1915, two others in 1916, three in 1917, and one or two each year following, until twelve men altogether were at work at the beginning of the present year. Students in 14 high schools to the number of about 450 were following the regular two-year course in agriculture, whilst public school pupils numbering approximately 10,000 in almost 100 schools, together with nearly 300 teachers, received regular assistance and instruction. Thus the District

Supervisor system of British Columbia may be regarded as one of the important developments in rural education made possible through the beneficence of the Agricultural Instruction Act.

Administration

All District Supervisors are graduates in agriculture and in most cases also professionally trained teachers. Three of the men now engaged are also graduates in Arts. For the first two years when the number of District Supervisors was very small, their salaries were paid in full from Agricultural Instruction Act funds. Since that time, however, as the number of district men has increased, the province has been steadily meeting a larger proportion of salaries until, at the present time, only 50 per cent of the cost of salaries is charged against the Federal grant. Under the original plan, and until this year, the school districts interested met the cost of all maintenance expenses such as class-room accommodation, supplies and equipment, hired day labour and paid the travelling expenses of their respective District Supervisors. Some alteration of this plan has been rendered necessary for the present year whereby the various districts concerned are bearing a larger proportion of the entire cost of the work including 50 per cent of salary.

Instruction Educational rather than Vocational

The work as conducted under the District Supervisors, whilst primarily educational, has a certain vocational value. It is so presented that the students get the most practical kind of instruction working out, as they do through laboratory exercises, experimental plots at school, and carefully selected and supervised agricultural projects at home, the various phases of soil management, crop production and selection, horticulture, live stock, dairying, and poultry keeping. The text book brand of agriculture which has been tried from

time to time in Canada during the last three-quarters of a century and which has always failed and will continue to fail, finds no place in our British Columbia system. Exposition has always been the curse of agricultural teaching and more or less of all science teaching. Independent thinking and doing on the part of every student must be insisted upon, and this training in obtaining knowledge at first hand soon makes itself evident in connection with other subjects. The greatest value from this line of study therefore is the development of personality and initiative on the part of the student rather than the intrinsic value of the information gained, however useful that may be. The educational merits of this as of most subjects depends more upon the method of instruction followed than upon any particular quality or merit belonging to the subject matter itself. The two aspects of the question are very well expressed in Dr. Grisdale's report for 1918-19, page 11, "The chief value of school agriculture and related projects," he states, "lies in the opportunity presented for training the intelligence through facts vital to country life, and therefore all junior extension movements should be regarded as instruments in the accomplishment of this object." So much for the educational aspect of the study. The vocational bearing of the work is then set forth. "These activities" (agricultural projects and club work), he says, "do much to awaken in the minds of the young people who engage in them, an appreciation of the possibilities of agriculture, and to stimulate a greater enthusiasm for agriculture as a vocation." This suggests education in agriculture whilst the former suggests education *through* agriculture, quite different things and both excellent—each in its own domain—and complementary one with the other.

Summer Courses for Teachers

The funds provided through the Agricultural Instruction Act could not be more advantageously applied than in the

providing of summer courses of instruction for teachers. Beginning in 1914, very thorough courses in elementary agriculture and nature study combined, under the name of rural science, were offered in 5-week courses. Teachers who completed two such courses—the preliminary and the advanced—were awarded diplomas as specially qualified teachers in that subject. Altogether 480 teachers have taken the preliminary course and 141 the advanced course. No summer school was held in 1916 and 1918. The salaries of the instructors giving the courses mentioned have been paid from year to year out of the federal grant. All teachers in connection with their Normal training course receive a limited amount of instruction in nature study and school gardening, good as far as it goes but entirely inadequate to meet the needs of the case, hence the added value of these supplementary summer courses.

Public School Work

Since the beginning of the work in 1913 a gradually increasing number of schools have instituted school gardens or school supervised home gardens. In 1913, as already stated, about 40 schools made small gardens, many of which did not prove successful chiefly on account of unplaced responsibility. Beginning in 1915, however, a standard of requirements was given out by the Department of Education which had the effect of stabilizing the work and giving to it more educational outlook. This meant considerable expense to school boards, hence the adoption of a scale of garden grants which were allowed to all school boards that complied with the regulations. Every year sees the inclusion of new gardens and also an occasional dropping of some of the older ones where results have not been wholly satisfactory on account of unfavourable conditions.

Last year 119 schools were officially reported as conducting standard school gardens, 194 teachers being engaged in

THE AGRICULTURAL GAZETTE OF CANADA

the work with 6,199 pupils enrolled in garden work. A school supervised home garden was conducted in 56 schools by 77 teachers with 721 pupils. Small bonus grants were allowed to these teachers in recognition of their efforts in conducting this special line of work, these grants ranging from \$10 to \$30 per year, according to the special qualifications of the teacher. These bonus grants as well as grants to school boards have been paid partly from Federal and partly from provincial funds.

Club Work and School Fairs

During the last few years the home-project work in gardening has gradually enlarged and now poultry, calf and pig raising are all making headway. An increasing number of teachers are yearly becoming interested in this line of school and home work, particularly in those districts where District Supervisors and Agricultural Representatives are located. All such clubs as are eligible are enrolled with the Department of Agriculture, which has official charge of that department of work. This club work is bound to increase, and with it the holding of school fairs, which are being

organized with greater efficiency every year.

Total Expenditures on Agricultural Education from the Federal Grant

As shown by the detailed financial statements forwarded from year to year, the following amounts have been expended and accounted for:—

1913-14.....	\$ 1,000
1914-15.....	15,000
1915-16.....	15,000
1916-17.....	15,000
1917-18.....	20,000
1918-19.....	20,000
1919-20.....	20,000
1920-21.....	20,000
1921-22.....	10,000
Total.....	\$136,000

In conclusion I wish to say that the various lines of work herein referred to have been only too long delayed in British Columbia. But for the timely financial assistance provided through the Agricultural Instruction Act little of what has been accomplished could have been done. What has been done is but suggestive of much more that needs to be done if the rural interests and the best home life of the Province are to develop, and if happiness and prosperity is to be the lot of our future citizens.

III. UNIVERSITY OF BRITISH COLUMBIA

Faculty of Agriculture

THE University of British Columbia first participated in the Agricultural Instruction Grant in 1918. Since then the amounts allotted have been as follows;—1918-19, \$8,000; 1919-20, \$12,000; 1920-21, \$20,000; 1921-22, \$23,000; total \$63,000. Of this amount \$43,000 was not received by the University until the last fiscal year, and at its close on March 31, 1922, a considerable sum was still on hand.

The policy under the Agricultural Instruction Act has been first to accumulate data on which to base conclusions, and then by means of bulletins and extension schools to carry these conclu-

sions to the farming communities. It was recognized at the outset that British Columbia agriculture was highly specialized, and that consequently it would be advisable to go into the various problems as deeply as possible. Tentative conclusions would lead us to believe that these assumptions were correct.

All work under the Agricultural Instruction Act is organized by projects; that is, the money is allotted for a certain work, rather than to certain men or departments. At the same time an effort has been made to encourage a major project in each of the five departments in the Faculty of Agriculture. The gen-

eral policy has been to collect data along certain lines as indicated below, and then to carry these to the people by means of extension schools in different parts of the Province. Insofar as possible, the extension men offer the instruction in the extension schools. This instruction is based on their investigations in the country and on the work of the departments at the University.

All publications under this Act have been published as Department of Agriculture bulletins. In this way an effort has been made to link up the work of the Faculty of Agriculture with the work of the Department of Agriculture for the Province.

Department of Agronomy

Fertilizer Project.—Under this project during the fiscal year 1920-21, 21 fertilizer experiments were laid out, 7 in the Interior and 14 in the Lower Mainland. During the year 1921-22, 22 experiments were conducted, 6 in the Interior and 16 in the Lower Mainland. Experiments in triplicate have been conducted on clays, sandy soils, alluvial, and cumulose soils. The following crops have been used; mangels, turnips, potatoes, small grains, tomatoes, alfalfa, and strawberries, and although it is too early to report definitely on results, figures thus far obtained indicate that considerable savings would be made were commercial fertilizers used more judiciously.

Clover and Grass Mixtures.—With the object in view of determining the population and the percentage of various grasses and clovers under different conditions, six clover and grass mixture experiments have been laid out so far on the Lower Mainland and in semi-arid localities. These are all located on crop producing areas; that is, no attempt has been made to solve range or grazing problems, in order to avoid any possible over-lapping of the work conducted by the Grazing Commis-

sioner appointed by the Provincial Department of Agriculture. These mixtures include red clover, mammoth clover, alsike clover, white clover, orchard grass, tall oat-grass, meadow fescue, and perennial rye and timothy, and it is hoped that valuable information will be secured regarding these clovers and grasses in different combinations, so that it may be possible in the future to emphasize those particularly suited to certain localities.

Weeds.—Recently, as a project in the department of Agronomy, arrangements were made with the Department of Agriculture, Victoria, to undertake the re-writing and re-organization of Bulletin No. 18, "Noxious Weeds, their Identification and Eradication" This can be done only after a careful survey of the weed populations in the more important districts.

Department of Animal Husbandry

Cost of Milk Production.—Under this project an excellent beginning has been made. During the summer of 1920 the work was extended to fifty-four dairy farms. A careful report was made to each farmer and, in addition, Department of Agriculture Circular No. 36 (Faculty of Agriculture, University of British Columbia No. 1) was published and distributed to those interested. During the summer of 1921, the work was extended to one hundred and twenty-four dairy farms. An extension and revision of the first circular, based on the second summer's work has been issued as Department of Agriculture Bulletin No. 91, "Dairy Farm Survey."

Department of Dairying

Experiments are being undertaken by this department with the object of determining the "Period of Usability of Milk" produced for market purposes, consumption, and for butter and cheese manufacture. In other words, the policy is to secure data with re-

spect to milk produced in British Columbia, in order that the accumulation and interpretation of such data shall make possible (a) the offering of advice on the important question of milk spoilage, and (b) diminution in the extent of this spoilage.

The investigations would seem to indicate that sufficient data must be secured to lend a certain degree of finality to the conclusions; that milk of widely varied quality must be examined; that an endeavour must be made to determine the test or combination of tests which might most suitably be employed for the grading of market milk. The chief end of the investigation is, however, an accumulation of sufficient data of such a nature that conclusion based thereon may lend to the term "Possible Period of Usability of Milk" a definiteness that it does not now possess.

A specific investigation of an outbreak of rosy milk was conducted by the Extension Assistant under this project as well, a paper on which is in course of preparation.

Department of Horticulture

Survey of Fruit Industries.—The proposed work includes the collection of data from varieties; distribution and value in the various districts; yields of trees at various ages; costs of production, and methods of distribution and sale.

Under this head a certain amount of work has already been completed and published in Department of Agriculture Circular. No. 38. During the summer of 1921, the work was continued and extended to a larger number of varieties. Studies were made on one hundred and eighty-nine farms in the Okanagan Valley. (See Department of Agriculture Bulletin No. 90).

"Survey work on small fruit farms and a study of the cost of production of strawberries and raspberries." This work was started in the spring of 1921 and has been extended to include one hundred and twenty-nine farms on the Lower Mainland and on Vancouver Island. A considerable amount of data has been collected and the work is being continued during the summer of 1922. (For full report see Department of Agriculture Circular No. 39).

Department of Poultry Husbandry

The project undertaken by the department of Poultry Husbandry includes a survey of poultry farms and the poultry industry in order to study poultry farm conditions, costs of production, systems of housing, feeding, and such problems as may present themselves.

To date complete reports have been made on seventy-five farms and partial reports on about seventy-five others. A beginning has been made in the analysis of the report.

In addition to the above, the co-operation of thirty poultry farmers has been secured for the purpose of keeping complete records of incubation and brooding results. Also, the co-operation of ten poultrymen has been secured in keeping cost accounting records on incubation, breeding, rearing, and egg production.

Extension Schools

During the past four years Extension Schools of four days' duration have been conducted in the places indicated below:—

1918-19—Courtenay, Armstrong, Nakusp, Creston. Total registration 196.
1919-20—Grand Forks, Gordon Head, Haney, Cloverdale, Mission and Hat-

THE AGRICULTURAL GAZETTE OF CANADA

zie, Cranbrook, Nelson, Celista, Kamloops. Total registration 570.

1920-21—Duncan, Courtenay, Maple Ridge, Malakwa, Murrayville. Total registration 175.

1921-22—Barriere, Nakusp, Invermere, Pitt Meadow, Pemberton Mea-

dows, Vanderhoof, Telkwa, Terrace, Total registration 732.

An effort has been made in these schools to lay special emphasis on fundamentals as well as on details, and it is felt that the courses have in every instance been attended with a large measure of success.

RÉSUMÉ OF AGRICULTURAL INSTRUCTION WORK IN PRINCE EDWARD ISLAND, 1913-1922

BY W. J. REID, B.S.A., DIRECTOR

IN the nine years during which the Agricultural Instruction Act has been in effect the province of Prince Edward Island has received from this source the sum of \$279,220.64. This makes an average of slightly less than \$30,000 per annum, and is the amount due on the basis of distribution adopted in connection with the Act. This grant has been carefully expended in Prince Edward Island for the furtherance of agricultural education and practical demonstration work. The results that have followed such work have been far-reaching in many respects.

In all departments the funds received from the Agricultural Instruction grant were devoted entirely to the work for which they were intended. A consideration of the various lines for which money has been apportioned will give an idea of the value of such work to the province.

Agricultural Buildings and Representatives

The province of Prince Edward Island is divided into three large counties, with a natural centre in each county, which has long been taken as the meeting point of the various agricultural interests. In 1913, a large centrally located building was purchased in each of two centres to be used as a meeting place for the farmers of the county, and also as an accommodation for seed fairs, short courses in agricul-

ture and other activities. In 1915, a fully qualified agricultural graduate was placed in each county to devote his full time to the service of the farmers and the farming industry. This work was a source of much improvement until it became necessary to discontinue it owing to the pressure brought to bear on eligible men for the World War.

Short Courses

One of the earliest activities entered into under the Agricultural Instruction Act was the holding of agricultural short courses. These were conducted first at central points, and were followed by similar courses at local points throughout the province. The classes conducted at the central points were of two weeks' duration and had an attendance of from 250 to 500. The work was of a practical nature and in each case was responsible for the beginning of local co-operative activities. The courses at local points were of one week's duration, and the attendance was from 30 to 115. Practical lectures and demonstrations formed the basis of the work, to which could be added the social and community benefit of discussing matters of common interest.

To say that this work is a benefit is but a modest interpretation of its results. Many organizations of local and provincial value have been started, including co-operative lamb sales, co-

operative hog sales, co-operative shipping associations, pig clubs, calf clubs, egg circles, and others of a similar character.

Demonstration Work

Another important work, the inception of which is due to the Agricultural Instruction grant, is the promotion of under-drainage. This has been carried on since 1916. At that time an investigation of soils from several localities was conducted to locate material of a nature suitable for the manufacture of drain tile, which at that time was not being manufactured in the province. This was found in sufficient quantity in one place to warrant the establishing of a plant. The plant has been operated during the past two years under the direct supervision of the Provincial Department of Agriculture. From estimates made it can be stated that many thousands of acres in Prince Edward Island are in need of under-drainage. This work is being conducted at the discretion of the land owners, and in every case is finding a reliable advocate for its adoption in the one who has had the work done.

Investigations have also been conducted in locating limestone deposits for the use of those who are in need of ground limestone as an improver of soil conditions. This would apply more particularly to the western part of the province where a limestone deposit of some extent exists. At this deposit a limestone pulverizing plant has been installed, and has been in operation for two seasons. The outcome has been to secure recognition of the beneficial effects of limestone, especially when applied to acid soils.

Attention has been directed from time to time to the culture of particular crops for the benefit of those who are making a specialty in some particular line. Clover growing has perhaps received the most attention and, for the benefit of the growers of this crop, two hullers were purchased and placed at their disposal.

Rural Science

This department was established and is being conducted in connection with the Prince of Wales College for the purpose of interesting teachers-in-training in the development of club work and in consideration of other agricultural activities among the students of their prospective schools. The one in charge of the teaching is also responsible for the conducting of a number of school fairs throughout the province during each season. In 1915, three school fairs were held, while in 1922 there were fifty. Each year is showing an improvement, not only in numbers but in the interest manifested by teachers and pupils. The work is also responsible for the inauguration of such activities as poultry clubs and, in several instances, pig and calf clubs.

Women's Institutes

In the Women's Institutes of the province we have one of the most influential organizations for the educational and social betterment of the community. Their inception and maintenance is entirely due to grants apportioned from Agricultural Instruction funds. The first institute was organized in 1913; in 1922, 62 institutes were in existence. The original object in establishing Women's Institutes was for the giving of instruction relating to domestic economy and its various branches, but they have since developed into a valuable medium for rural organization and social up-building.

Agricultural and Technical School

The establishing of the Agricultural and Technical School was the outcome of the request of many young men throughout the province who were desirous of obtaining instruction in the elementary grades of academic work and in agricultural studies of a practical and partially scientific nature. The money for the development of this school was apportioned from the Agri-

cultural Instruction grant and from the Dominion grant for Technical Education. The first course was conducted in 1920 and met with an encouraging reception from all classes. The attendance has grown with each succeeding class until at the present time it is well over 75.

It will be obvious from this brief statement that the Agricultural Instruction grant has been an important factor in the life and maintenance of many agricultural activities in Prince Edward Island, with consequent benefit to the industry in general and to many of its branches in particular.

DAIRYING AT THE OKA AGRICULTURAL INSTITUTE, QUEBEC

BY REV. BR. ISIDORE, LECTURER IN ZOOTECHNY

AT first our herd consisted of grade cows, some with Ayrshire blood, others with Jersey or Canadian blood. At present, there are only pure-bred animals. After experimenting with the various breeds found in Canada, our choice finally settled on the following given in numerical order: Ayrshire, Canadian, Holstein.

Our purpose in keeping several breeds is entirely educational: to enable our students to learn *de visu* the respective value of these breeds, which, it should be stated, are also the breeds that appear to be the most suitable for the farmers of the province, according to whether the milk is sold for cheese making, or butter making or for direct consumption.

Of the three breeds above mentioned, the Ayrshires are in great majority, constituting three-quarters of the herd.

Why the Ayrshire has the Preference

The Ayrshire cow has many qualities appealing to all lovers of good cattle—symmetry of form, elegance of carriage, beautiful colour—which do not detract in any way from her producing capabilities, provided care is taken to develop her milking qualities along with her show qualities. This object is attained by selecting with a view to developing the following characteristics of conformation: good top line, as level as possible along the whole length of the back; a roomy chest, well developed on all sides, showing a strong constitution; a large and ample abdomen, showing great

capacity of assimilation, and lastly, well developed milking organs and specially a symmetrical udder. A cow of this description does well at any show and is a profitable milker.

If one goes back to the origin of the Ayrshire one finds an explanation for these many excellent characteristics which are the attributes of the breed. The severe climate of the part of Scotland where the breed was improved gave it a hardiness uncommon among dairy cattle, and the crossbreeding done in the early history of the breed is responsible for many splendid and valuable qualities. The Ayrshire cow has a strong constitution and enjoys good health. She is a good eater, which is very important so far as production is concerned, and is not at all difficult to please as regards feed. She eats and makes good use of all the kinds of grasses that are found in the pasture. She might be called a "cosmopolitan" cow as she is readily acclimatized and thrives under different latitudes; and does as well in a hilly country as in a flat one. The Ayrshire is a very good cow for the ordinary farmer, as she requires little in the way of care and feed and brings a good profit, even when kept under rather unfavourable conditions. Another quality of the Ayrshire is her longevity. She is a good breeder, and breeds until an advanced age.

The milk of the Ayrshire may be used for all purposes, but it is specially valuable for direct consumption, being easy

to digest, chiefly on account of the small size of the flat globules, which facilitates absorption. It keeps well, as the cream, being made up of these small globules, does not rise so fast as in other milks; moreover, after a prolonged rest, these globules mix more readily and more completely with the serum of the milk, and this is an advantage in commercial milk. The flavour of this milk is due to a comparatively high percentage of fat. Physiology has taught us that milk testing more than 4.5 per cent of fat is difficult to digest, while milk containing less than 4 per cent of fat has not so good a flavour.

The French-Canadian Cow

The French-Canadian cow is easy to keep. She thrives and gives a good profit in places where other breeds would pine away or would not find sufficient feed to maintain their lives. The little care that she has received, specially during the winter months, has made her accustomed to hardships and therefore she is hardy. The French-Canadian cow is a good "rustler", she is well adapted to farms where production is limited. Her qualities may be summed up as follows: rusticity, frugality, good dairying qualities, milk rich in fat, long milking period.

Going back to the origin of the breed, we find that it has a common origin with the Jersey and Guernsey breeds, and that the Normandy and Brittany cattle, introduced in Canada at the beginning of the 17th century, also played their part. This breed is therefore one of the oldest found in Northern America. The influence of surrounding conditions, particularly the severe climate of the province of Quebec, and the treatment that the breed has received during those two centuries and a half, have caused changes in colour as well as in conformation, but aptitudes or qualities have been maintained. For this reason the French-Canadian breed of cattle has been termed the "Jersey of the North."

A characteristic of the French-Canadian cow is the production of rich milk, and under this head she comes between the Jersey and the Guernsey. Her milk yields an average of 4.5 per cent of fat, but she is not quite equal to the other breeds as regards the quantity produced. However, in order to qualify for the Record of Performance, a cow must give the following quantities of milk and fat in 365 days:—

Age	Milk lbs.	Fat lbs.
2 years	4,400	198
3 "	5,200	234
4 "	6,000	270
5 "	6,800	306

To-day, in localities where this breed is raised on a scientific basis, endeavours are being made to improve it as regards fineness of form, early maturity, increased weight, and milk production, while keeping at the same time the percentage of fat.

Although the French-Canadian cow is an old breed in the province of Quebec, it is only recently—about 1880—that the work of improvement was begun, and only in 1886 that a Herd Book was established by the Quebec Legislature. A new impulse was given to the improvement of the breed in 1895 when the French Canadian Cattle Breeders' Association was established.

The colour of the French-Canadian cattle varies from solid black to fawn, but a brown skin is preferred, and in this case there is a yellow or fawn stripe along the back and a grey or yellow ring around the muzzle. It should be stated here that this fawn colour, this stripe and this grey circle do not, in any way, indicate infusion of Jersey blood in Canadian cattle, as is so often claimed. There is nothing astonishing in the fact that rather striking similarities are found among animals of both breeds; it simply shows their identity of origin.

Does the French-Canadian cow deserve to be kept? The results obtained in the Pan-American contest of dairy cows held at Buffalo in 1901 show

that the French-Canadian deserves a place of honour among the cattle of North America. The following is taken from the Herd Book of Canadian cattle, vol. 1, page 11:—

“Cost of feed to produce 100 pounds of milk:—

For Canadian cows.	45-8 cents
Jerseys.	51 “
Guernseys.	50 “
Ayrshires.	44 “
Holsteins.	41 “
Shorthorns.	54 “

“Cost of feed to produce 1 pound of butter:—

For Canadian cows.	11-03 cents
Jerseys.	13-16 “
Guernseys.	11-11 “
Ayrshires.	11-61 “
Holsteins.	13-18 “
Shorthorns.	14-22 “

“It may be seen therefore that the French-Canadian cows come third in cost of production for milk, and first as regards the cost of production of butter.”

Although this report is an old one and the cost of production of 100 pounds of milk or of a pound of butter is no longer the actual cost, these figures give a comparison between these various breeds as regards the cost of production of milk and butter. Other examples might be quoted to show that the French-Canadian cow is an economical producer of butter.

Cow Testing

Cow testing is our great means of improvement. The yield of milk and butter given by our cows has been regularly checked. It is by means of constant testing and of the stimulation that it gives that we have succeeded in establishing a herd composed of cows with very satisfactory yields, as proved by the figures appearing in this article.

Cow testing enables us to eliminate from the herd cows which do not pay; it is the best way to improve a herd in a very few years. Of course, cow testing must be followed up by liberal and scientific feeding and a careful selec-

tion of breeding animals. We cannot recommend too highly the regular testing of each one of the cows of a herd. Every time that we have the opportunity to do so, we advise the breeders to join a cow testing association as we are convinced that this is the best way to increase the production of milk. If there is an advantage for the breeder to adopt cow testing, this advantage is much greater when the farmer keeps pure-bred animals, owing to the increase in value that a record gives to the progeny of a good dairy cow.

Cow testing is now generally practised in Canada. Cow testing associations are established in all the provinces of the Dominion. The last report of the Chief Dairy Extension Agent shows that the province of Quebec is greatly ahead of the other provinces in the number of cows tested. It is also shown that the general average per cow has increased since cow testing was practised, having gone up from 5,285 pounds of milk and 195.5 pounds of fat in 1915, to 5,801 pounds of milk and 214 pounds of fat in 1921; but this production is still too low.

Let us see the averages that were obtained at the Oka Agricultural Institute during the milking period extending from June, 1921, to June, 1922, with the same care and the same feed that may be given by any breeder.

The general average of the herd was:—

	lbs.
Milk.	8,901
Fat.	346
Butter.	407

The average production of Ayrshire cows was 8,984 pounds of milk and 345 pounds of fat, or 406 pounds of butter; whilst the average production of French-Canadian cows was 8,345 pounds of milk and 361 pounds of fat, or 425 pounds of butter.

In the milking period of 1918-19, we secured as an average 7,667 pounds of milk for Ayrshires and 6,624 pounds for French-Canadians showing an increase

THE AGRICULTURAL GAZETTE OF CANADA

of 1,317 pounds of milk per cow in the first case and 1,721 pounds of milk in the latter one.

Our ambition is to have a herd entirely composed of cows qualified for the Record of Performance. Although we entered this test only in 1918, we have succeeded in qualifying, so far, as many as thirty-six cows. The average production of Record of Performance cows is, for the Ayrshires, 9,884 pounds of milk and 386 pounds of fat, and for the French-Canadians, 8,580 pounds of milk and 386 pounds of fat. It should

Victory Bond"—58467—sired by "Glenhurst Torr Mayor"—43480—an ex-champion of Canada. His mother "Maple Leaf Jean"—47434—is a well-known cow in the Ayrshire world. She is not only remarkable by her conformation, which is almost ideal—the prizes she has won in the fairs prove this—but also by her high milking qualities. At the age of four years, in Canada, she made a record of 12,356 pounds of milk and 472 pounds of fat in 315 days milking. In 1919, at the Toronto exhibition, she won the silver cup presented by Mr. Turner for



Representatives of the Ayrshire Herd at the Agricultural Institute, Oka, Que.

be stated that several of these cows have competed in the the two-year class.

Although such results appear to be quite satisfactory for a herd including about fifty cows, we do not intend to stop there. We will endeavour still to increase the production per head by the means already mentioned: selection, better feeding, and the use of sires selected with the greatest care. We are putting great hopes on the sires we now have in order to attain this object.

Ayrshire Bull.—At the head of our Ayrshire herd, we have "Springburn

the best cow entered in the Record of Performance.

In its issue of December, 1920, *The Field* of New York gave the annual yield in milk and fat of "Maple Leaf Jean," purchased by the "Middlesex Meadow Farms" for \$5,000. This semi-official record was given as follows: milk, 16,271 pounds, fat, 614.69 pounds. But in 1922, this cow beat her own record, giving 18,078 pounds of milk and 618 pounds of fat in 310 days milking, thus winning the world's championship in her class.

THE AGRICULTURAL GAZETTE OF CANADA

As an exhibition animal, "Maple Leaf Jean" won prizes wherever she was shown. In its issue of August last, *The Canadian Ayrshire Review* stated: "During her career as a show animal, 'Maple Leaf Jean' won the following honours: 1916, 1st prize at Huntingdon and at the National Exhibition of dairy cattle; 1918, 1st prize and champion at Ormstown, 1st prize for milk production among cows qualified in Record of Performance, 1st prize at Ottawa in the dry cows class and champion No. 2 (reserve champion); 1919, 1st prize in the dry cows class, 1st prize for cows qualified in Record of Performance—senior and grand champion at Toronto; 1920, 1st senior and grand champion at the Maryland exhibition, 1st prize for milk production (H.R.) at the National Exhibition of Dairy Cows; 1921, 1st senior and grand champion at Brockton, 1st prize in a contest for the production of butter at Waltham.

"No cow of the Ayrshire breed has equalled this record, whether as regards prizes won in fairs or for persistency in milking."

The above shows that "Maple Leaf Jean" is remarkable both for her successes at fairs and for her unequalled milking qualities. The many records that she has made also demonstrate her robustness. We can therefore justly be proud to possess the son of such a famous cow, and we hope that her progeny will inherit her qualities. "Springburn Victory Bond" is now four years of age and weighs 1,810 pounds.

French-Canadian Bull.—Our French-Canadian bull, "Ottawa Beau Second"—5344—supplied by the Central Experimental Farm, is out of "Denise Fortune"—3807—whose record at three years of age was 10,133 pounds of milk and 471 pounds of fat.

Holstein bull.—Korndyke King Raymondale—49839—is our Holstein bull, whose mother, Raymondale Helena Korndyke, at the age of one year ten months and 25 days made a record of 20.20 pounds of butter and 425.40

pounds of milk in seven days milking. This cow has five sisters with a record of over 30 pounds of butter in seven days' milking. The sire has also five sisters with a record, one of which is a world's record. Among the ancestors of Korndyke King Raymondale the following should also be mentioned: Avondale Pontiac Echo—18352—having fifty-one daughters qualified and who is himself out of May Echo Sylvia by King Artis Canada—10042—and also Korndyke Queen Dekol 6th—27465—with a world's record in seven days of 37.26 pounds of butter and 781.0 pounds of milk; her highest production in one day being 122 pounds of milk.

Sanitary Stables

But all those means of improvement of the dairy herd (scientific and generous feeding, cow testing, use of a good bull) would be of no avail if the rules of hygiene were not observed. It is well known that the more animals are improved and specialized in their line, the more particular they are as regards the surrounding conditions in which they live. In order to satisfy their needs, the stables in which they live should afford sufficient space as well as a good cube of air. If cows are kept in small and partly ventilated stables, their vitality is bound to be weakened and they become more susceptible to contagious diseases. A sanitary stable therefore should be spacious, well ventilated and well lighted.

In order to provide for these conditions, the Oka Agricultural Institute has built a new stable, arranged as follows: the new building include two wings placed at right angles with the modern barn built in 1916, and each of these wings can accommodate thirty-six cows. The sanitary conditions are of the best, and the general arrangement is pleasing and attractive for the staff and the pupils at work on dairy experiments, as it is well known that pleasant surroundings make for efficient work. The work has been made as light and as easy

as possible. Water is supplied automatically in individual fountains. Each of the two stables includes two rows of stalls, and the cows are placed head to head, a labour-saving arrangement, as regards distribution of feed. The troughs are joined together in order to facilitate cleaning, and provided with traps and drains by which they may be easily washed. There is ample space, abundant light and plenty of fresh air.

The nature of the ground and the buildings already in existence did not allow us to place this stable as we would have liked. In the construction of

the morning and noon sun in winter months, is preferred by some practical men.

Whatever may be the value of the various theories, we have chosen the middle course, since our stables are placed northwest and southwest as regards length, and face southwest and northwest. There are sashes on three sides of the building. The only part that has no sash is the gable at the north west end. In this way the sun's rays penetrate the stables all day, either on one side or on the other.

The stables are fireproof. No wood



Cows of the French-Canadian breed in the herd at the Agricultural Institute, Oka, Que.

stables, it is recommended to set the building north and south as regards length, so as to have the two faces exposed east and west. With this arrangement, in the case of a cow stable, the sun's rays strike the building directly in the course of the afternoon and if the cows are put in the stable for milking, they may suffer from the heat unless milking is delayed until late in the evening. This is why an east and west setting, with the long side of the building north and south, so as to have more of

whatever has been used in their construction. The sides are of hollow cement brick, and where the walls include only one row of bricks, they are covered with terra-cotta, and the whole is coated with hydrated lime.

The roof is of reinforced concrete, six inches thick. Above this concrete roof are two rooms, one of which is filled with white asbestos, so as to prevent any dripping and keep the temperature of the stable normal. The ceiling is pierced with ten openings with triple

sash, giving abundant light in the building. The roof is supported by twelve iron pillars, also used as supports for the stanchions.

Cement being a good heat conductor, a concrete floor is naturally cold and may be the cause of udder troubles or even of abortion. These difficulties are corrected by the use of a thick litter, or better by covering the part of the stand on which the cow lies with cork bricks or creosoted blocks of wood, placed vertically. These bricks, as well as the blocks, are warm and last a long time. This is how this part of our stables was built: A layer of stones was put on the earth, then a layer of cinders from 4 to 6 inches thick, then hollow bricks of terra-cotta cemented in, then a coating of $1\frac{1}{2}$ inches of cement. The front part of the stalls on which are the front legs of the animal, is made of creosoted blocks of wood, making a stand not so hard and less slippery, thus preventing injuries to the knees.

Each of the stables measures 75 feet long by 40 feet 8 inches wide and 11 feet high, thus insuring a cubic space of over 900 feet for each of the 36 cows that they may contain, which is amply sufficient. The stalls are arranged in two longitudinal rows, which saves time. The passage behind the cows is eight feet wide, and this makes it possible to keep the outside wall clean, which is rather difficult to do when the passage is only three or four feet wide.

To make it easier to keep the cows clean, it is important that the gutter be wide enough, as if the gutter is narrow and not deep enough, the manure accumulates and soils the hind quarters of the cows when they are lying down. In our stables the gutter is nine inches deep on the stall side and six inches on the opposite side. It is 20 inches wide, with a double slope, $\frac{1}{2}$ an inch on the side of the passage, and one inch by 8 feet on the side of the liquid manure tank. The length and width of the stalls vary, according to the size of the cows that are to be placed in them,

from 4' 6" to 4' 8", and the width from 3' 4" to 3' 7". The trough is 24" wide and 6" deep; the angles are oval; the bottom of the trough is one inch higher than the floor of the stall, thus making it easier for the cows to get their food. The central passage is 7' wide.

Fresh air is necessary for the maintenance of good health, without which the milk flow cannot be of long duration. In fact as regards milk production, pure air is almost as necessary for dairy cows as feed and water. A good ventilation system is indispensable in the stable, for cows in poor health cannot be profitable producers. Therefore the number of fresh air openings was not spared in this stable, although care was taken, at the same time, not to lower the temperature in the stables below the normal temperature which should be about 50 degrees F. If the temperature is lower, not only do the cows yield less, but they consume more feed for the maintenance of bodily heat. When the temperature in the building is sufficiently high, the renewal of the air takes place through convection. This is one of the chief factors responsible for the circulation of air in buildings inhabited by animals. The air warmed by the contact with the animals rises towards the top part of the building and is replaced by pure air coming from the outside.

The fresh air openings measure 8" x 5", and are ten in number; they are placed every 15 feet on each side of the stable, and are supplied with a regulator. Fresh air comes in through an opening, above the foundations. It passes into a chimney made of cement blocks, forming part of the wall of the stable, and enters the building nine inches from the ceiling. The openings of the ventilators for the escape of foul air are also situated at the ceiling and at the centre of the stable. They are three in number and measure 15" x 15". With this system of ventilation, the animals are not exposed to chills through drafts of air coming from the outside.

If fresh air is necessary, sunlight also plays an important part in the maintenance of the health of live stock. The germs of contagious diseases are soon killed by direct sunlight. In addition, an abundance of light keeps the atmosphere of the stable dry, which also contributes to the comfort of the animals. For economical and sanitary reasons there are double sashes. The panes of single sashes soon become covered with ice in winter, making the atmosphere in the stable damp and unsanitary, preventing the sun's rays from penetrating inside and causing a great loss of heat.

There are 45 sashes in each stable, including those in the ceiling, giving an area of 9' 8" per cow. These sashes are divided in two parts, the top part covers one-third of the total height, and opens by means of hinges; the interior sash opens from top to bottom, and the inside one from bottom to top. If at certain times of the year the sashes are to be used for ventilation purposes, the air coming from the outside is directed towards the ceiling, and does not cause any discomfort among the cows. This arrangement of the sashes compels the air to make a curve which slows up its process and allows it only slowly into the stable.

The New Dairy

The care taken in the handling of the milk has a great influence on its conservation and therefore on its value. To prevent milk from taking a stable

odour and to keep it its sweet pleasant flavour, it should be taken to a separate room, some distance from the stable. With this object in view, during the summer, a dairy was built, communicating with the two stables which are about 50 feet away from each other. This dairy includes two rooms, one of which is specially arranged for cooling the milk.

Manure Tank and Shed

The last improvement I desire to mention is the construction of a liquid manure tank and a covered shed, thus completing our new dairy barns. The liquid manure tank, of cylindrical shape, is made of cement blocks. It measures 12 feet high and 20 feet in diameter. Its capacity is of 22,600 gallons of liquid manure. This is sufficient to hold all the liquid manure from 125 cows during six months. This tank is in close proximity to the manure shed, which is about fifty paces from the new stables. This shed includes a square platform of 25 feet by 25 feet, surrounded by a cement wall, 4 feet high, topped with a galvanized iron covering 12 feet high, and lastly with a wooden roof, covered with galvanized iron shingles. Manure is brought to the shed by means of litter carriers, or in summer it is thrown directly into the spreaders, and in winter into wagons, to be taken directly to the fields.

AGRICULTURAL MERIT DAY IN QUEBEC

THE Agricultural Merit celebration, held this year at the Quebec National Exhibition, was an event of an unusually imposing and impressive character, surpassing in importance that of any previous year.

On the morning of the 6th of September, 1922, all the laureates of the Order of Agricultural Merit, wearing their badges, met on the Agricultural Merit square at the Exhibition Park, and while Mr. Hildebert Létourneau of St. Pierre de Montmagny, recipient

THE AGRICULTURAL GAZETTE OF CANADA

of the gold medal for this year, hoisted the official flag of the order at the mast of honour, the band played "O Canada", and each and every assistant paid homage to agriculture.

A parade then took place of all the laureates through the central avenue of the park, as far as the stand, where rewards, medals and diplomas were distributed.

A handsome silk flag, with the Agricultural Merit colours, was presented to the Minister of Agriculture, after the reading of an address expressing the gratitude of all the citizens for the valuable services that he had rendered to agriculture in the province. In his reply the Minister took advantage of the occasion to recall the modest beginnings of the Order. Established in 1890 by Honoré Mercier, the Order has known days of decline, as have all human institutions, but a new impulsion was given in 1917, and since that time it has progressed every year in number of members and in importance. While there had been only about 200 competitors in a period of twenty years, nearly 500 have been recorded since 1915.

The surviving laureates, carrying the flags of the Order, were presented to the crowd by the Minister of Agriculture and greatly cheered.

The young laureates of the Juvenile Order of Agricultural Merit, establish-

ed last year, were also awarded decorations. The winner of the gold medal, Irénée Provost, aged 12 years, received a splendid pure bred filly, and the winner of the silver medal, Ph. Rhéaume, aged 11 years, received a Planet machine.

This year's ceremonies were invested with a special character. It was the first time that the highest religious authorities of the land were represented by Canon Arsenaux, special envoy of Cardinal Bégin, besides the highest civil authorities, in the person of the Lieutenant-Governor.

The series of feasts is generally closed every year by a banquet given to the laureates. This year the banquet was characterized by the distinction of the guests and the eminence of the speech makers. Those who spoke on this occasion were Messrs. L. A. Taschereau, J. E. Caron, W. R. Motherwell, Dominion Minister of Agriculture, Michaud, A. Grenier, O. Lessard, G. A. Bouchard, J. H. Grisdale, Joseph Samson, mayor of Quebec city, and others.

The Order of Agricultural Merit is the only institution of the kind in America. The credit of its establishment belongs to the province of Quebec, which always leads in all agricultural innovations as well as in all patriotic movements.

AGRICULTURAL MERIT AWARD

ON the recommendation of Mr. J. Ed. Caron, Minister of Agriculture for the Province of Quebec, Mr. Oscar Lessard, secretary of the Council of Agriculture, has been awarded the diploma of Very High Merit in Agriculture by the Provin-

cial Government as a recognition of his services to the cause of agriculture since he has been in the employ of the Department of Agriculture.

Mr. Lessard, who has been secretary of the Council of Agriculture since June, 1909, has been in the employ of the Government for thirty-two years.

This diploma was awarded Mr. Lessard under an amendment to the Revised Statutes of 1909. Under the old Act this reward could be granted only to persons residing outside of the province. Under the amendment passed last year, this reward may be granted to all residents of the province who

have given signal service to agriculture. Three residents of the province received this distinction prior to Mr. Lessard: Mr. I. J. A. Marsan, secretary of the Judges of Agricultural Merit, Mr. Aug. Dupuis, horticulturist of Saint-Roch-des-Aulnaies, and Dr. J. C. Chapais.

BETTER FARMING TRAIN IN THE PROVINCE OF QUEBEC

A BETTER farming train, arranged for by the Provincial Department of Agriculture with the co-operation of the Canadian Pacific Railway Company, is now touring the province of Quebec. This train is under the direction of Mr. Alphonse Désilets, B.S.A., Director of Agricultural and Economic Science teaching, and Mr. J. Dougall, of the Canadian Pacific Company. It includes fifteen cars, each dealing with a branch of agriculture, as follows:—

1. Grading of hogs;
2. Feeding of live stock;
3. Breeding bulls and bacon hogs;
4. Live stock judging;
5. Dairy cows;
6. Sheep and hogs for slaughtering;
7. Dairying and co-operation;
8. Field crops;
9. Rural engineering and farm buildings;
10. Horticulture and fruit culture;
11. Poultry;
12. Beekeeping and maple sugar;
13. Home industries;
- 14-15. Administration and management.

The contents of these cars are interesting to both farmers and city residents alike, and both will find a visit profitable. There are miniature models of dairy and farm buildings. All the things that may interest the market gardener are found among the exhibits. Keepers of poultry will find some fine exhibits of the best breeds of fowls and,

in addition to public demonstrations, information is given directly by the chief of this department. All those interested in maple sugar-making, beekeeping, underdrainage, field crops or horticulture, are sure to get useful lessons and valuable information.

In the Home Industries Department, products revealing the industry and skill of the Canadian woman are shown.

Splendid specimens are exhibited in the Live Stock car and competent lecturers, with the assistance of capable demonstrators, teach the best methods of breeding.

Lectures and demonstrations are given from 10 a.m. to 10 p.m. at every stop. The professors and lecturers are the following: Rural economy, Mr. A. Désilets; live stock, Messrs. X. N. Rodrigue, J. Gautreau, E. N. Bonneau, I. R. Martin and Ph. Rodrigue; dairying, Louis Bibeau; field crops, A. Mathieu, P. H. Vézina and Emila Lods; farm buildings, B. Chartier; drainage, R. Barbin; horticulture and floriculture, Gabriel Billault and J. Cholet; fruit culture, J. M. Talbot; poultry, L. Crevier; management of the maple sugar bush, L. J. A. Dupuis and A. Lalonde; agricultural co-operation, Ls. Bérubé; home industries, L. M. Gagnon, Mlles. Leblanc, Duval, Durand, Couturier and Paré and Mme. Lacroix. Messrs. M. Morissette and J. Morin are the supervisors of the train. The teachings of the day are summed up every night by lantern slides.

THE CONGRESS OF QUEBEC WOMEN'S CLUBS

THE second general convention of the Women's Clubs (*Cercles de fermières*) of the province was held at Quebec from August 30 to September 5, 1922, under the patronage of Mr. J. Ed. Caron, Minister of Agriculture.

The congress was held in conjunction with the Quebec National Exhibition. About 200 delegates, representing 70 clubs, including about 5,000 members, distributed in 40 counties, attended the sessions, under the presidency of Mr. Alphonse Désilets, B.S.A., General Superintendent of the Clubs.

The programme, which was very comprehensive, included the following lectures, given by the officers of the Department:—

"The farmer's wife at home," by Mlle. Eveline Leblanc.

"Agricultural representatives and Women's Clubs," by Mr. F. N. Savoie.

"The farmer's wife in the garden," by Mr. J. H. Savoie.

"The Women of Acadia," by Mlle. Benoite Leblanc, of the Department of Agriculture of New Brunswick.

"Domestic science teaching," by Reverend O. Martin.

"Keep the girls at home," by Judge Choquette.

"The farmer's wife at school," Mr. C. J. Magnan, general inspector of Catholic schools.

"The Women's Institutes," by Miss Eleanor M. Roach, director of English Clubs.

Appropriate speeches were made by Mr. J. Ed. Caron, Mr. Antonio Grenier, Mr. F. N. Savoie, etc., congratulating the women for their work, and specially Mr. Désilets, their energetic superintendent.

Saturday afternoon, after a general gathering at the Louis Hébert's monument, the delegates visited the city, and on Sunday afternoon they were received at St-Jean, Ile d'Orléans, by the club of the parish. A social evening organized by the club was greatly enjoyed by the excursionists. On the closing day, an official flag, green, white and yellow, was drawn and won by Mme. Painchaud, secretary of the Ile de la Madeleine Club.

A banquet concluded a busy week which will rank among the best in the memory of the delegates.

MICHIGAN STATE EXTENSION SERVICE AND FARM BUREAUS

BY W. D. JACKSON, ASSISTANT DIRECTOR, ONTARIO AGRICULTURAL REPRESENTATIVE BRANCH

FIVE members of the Agricultural Representative service of the Ontario Department of Agriculture visited the State of Michigan during the month of June for the purpose of studying the work of the Agricultural Extension Service and Farm Bureau organizations of that State. The party motored through the counties of St. Clair, Lapeer, Tuscola, Huron, Sanilac, Genesee, Shiawsee, Jackson, Washtenaw, and Wayne. In each county the office of the Farm Bureau was

visited, where the work of the Bureau and the State Extension Service was discussed with the county agent. Visits were also made to various co-operative organizations in the different counties, such as co-operative elevators, live stock shipping associations, and co-operative retail stores.

The Agricultural Extension Service and Farm Bureaus in Michigan are organized on the same basis as in New York and other states, although the Michigan State Farm Bureau has made

THE AGRICULTURAL GAZETTE OF CANADA

greater strides in linking the County Farm Bureaus up with the State Bureau, and in organizing state-wide selling agencies on a commodity basis.

Extension Service

The Agricultural Extension Service in Michigan aims to convey to the agricultural population of the State through its different agencies the best and most advanced information and methods regarding all phases of agriculture and farm practice, which, when adopted on the farms, will elevate the agricultural standing of the State and add to the well-being of its farmers. The Extension division is connected with the Michigan College of Agriculture at Lansing, and acts as the connecting link between the college and the farmers of the State, and in conveying the results of experiments and investigations to the rural districts. It co-operates with the following agencies: County Agricultural Agents, Home Demonstration Agents, Boys' and Girls' Club Leaders, the Farm Bureau and other agricultural organizations. Extension specialists attached to the Extension division and staff of the Agriculture College are available to assist the various agencies mentioned in carrying out their programme in any particular line of work. This organization links up the College of Agriculture very closely with the farmers of the State.

County Agents

In June last, Michigan State had 59 County Agricultural Agents and several assistant county agents. There were a number of Boys' and Girls' Club Leaders, and five or six Home Demonstration Agents, attached to the offices of the county agents. During the war period a large number of Club Leaders and Home Demonstration Agents were employed, but with the financial retrenchment which followed, the number has been greatly reduced.

The County Agricultural Agent is the county representative of the Farm Bureau and the State and Federal De-

partments of Agriculture, and acts in much the same capacity as an Agricultural Representative in Ontario. The work of the county agents is financed largely by the local County Farm Bureaus, and as the county agents are employed by these bodies their work is rather more commercial than educational.

Farm Bureaus

The County Farm Bureau is an association of farmers organized to develop agriculture and improve rural conditions by co-operating with township and county organizations and State and Federal Departments of Agriculture in planning and putting into effect the various projects outlined for the county agent, or other lines of work adopted for the improvement of agricultural conditions. The Farm Bureau elects at its annual meeting each year an executive committee which meets monthly or at stated periods to conduct the business of the organization. This committee secures the necessary funds, authorizes expenditures, and engages the County Agricultural Agent who has been approved by the Extension Division of the State Agricultural College. There are 97,000 farmers members of the Michigan State Farm Bureau. These members are signed up for a period of three years at a membership fee of \$10 per year. Five dollars of this fee is retained by the County Farm Bureau, four dollars and fifty cents goes to the State Farm Bureau and fifty cents to the American Federation of Farm Bureaus. Twenty-five cents of the fee retained by the County Bureau is set aside as a subscription fee for *The Farm Bureau News*, which is published by the local organization and edited by the county agent.

The Michigan State Farm Bureau is the central head of the County Farm Bureau organizations, which represents and speaks for all the farmers of the State. Knowing that farmers must sell their products as well as produce them if they are to receive their full share

THE AGRICULTURAL GAZETTE OF CANADA

of the final returns, the Michigan Farm Bureau has committed itself to the commodity plan of organization for marketing farm products, and, as the general manager states "is lending its energy towards the construction of powerful selling agencies or exchanges for the handling of the major agricultural commodities of the State. These exchanges are directed and entirely controlled by the growers of the commodities, the Farm Bureaus plan contemplating only the federation of these exchanges so that they may work together more effectively to attain common ends." The membership in the Elevator Exchange, for example, is made up of the hundred or more local co-operative elevators throughout the State. The Elevator Exchange sells the produce and makes returns to the local co-operative elevators, which in turn make returns to their individual members. The farmers have a voice in the management of the exchange through their elected representative from the local co-operative elevator. The same plan applies to the Live Stock, Potato, Fruit, Sugar Beet, Milk, and Produce exchanges.

The State Farm Bureau maintains for the benefit of its members seed, wool, purchasing, traffic, legislative, educa-

tional, and auditing departments. These various departments are maintained on the basis of services at cost and serve county farm bureaus, local co-operative organizations, and the commodity marketing exchanges. The local farmers organizations have taken every advantage of this service offered by the State Farm Bureau and have therefore been able to place practically all of their organizations on a sound and permanent working basis.

The State Farm Bureau is directed by an executive or governing board, elected by the directors from the various county farm bureaus at their annual convention. The future plans of the organization provide for an affiliation of the commodity marketing organizations with the State Farm Bureau on the basis of their common interests. Under this plan the Exchanges will have representation on the executive of the State Bureau and the Bureau in turn will be represented on the executive of the various marketing exchanges. This plan links all the farmers' organizations very closely together for the development of agriculture through the States from both the production and marketing standpoint.

THE FARM BUREAU AND ITS BRANCHES

R. Schuyler, Agricultural Representative, Brant County, Ontario

THE Michigan State Farm Bureau is located at Lansing and may be said to be the executive organization representing the different branches contributing toward its support, namely, the purchasing department, seed department, wool exchange, traffic branch, and the publicity and auditing branch, representatives from each of which together appoint their officers who direct the operations of the State Farm Bureau. These officers consist of a manager and secretary-treasurer with helpers. The directorate of the Farm Bureau is

influential in deciding the agricultural policy of the State, the secretary-treasurer sitting on many State Agricultural Committees. Practically all commodities produced on Michigan farms are handled through this organization or affiliated organizations; for instance, the Live Stock Exchange located at Detroit and the Potato Exchange at Cadillac have a working agreement with the Farm Bureau whereby each assists the other in selling commodities if necessity arises.

The purchasing department is but recently organized, but the intention is

that it shall purchase through its manager for its members all the commodities used on the farm. There are some six hundred co-operative associations in the State, a large portion of these working in co-operation with the Farm Bureau.

The seed purchasing department not only purchases seed for the farmers of the state but seeks to promote the best varieties of farm crops, first by locating them, second, by assisting the College in trying them out, and third, by selling them to the members after they are proven to be of value. This department alone did \$3,000,000 worth of business last year. There is no government standard for seeds in Michigan, but the Farm Bureau has established what is known as "The Farm Bureau Standard," and all bags are branded as such. Their standard is above the government requirements, and all seeds handled by them are returnable if not of the quality specified. They are now the official distributing agents for the North Dakota and the Idaho Grimm Alfalfa Seed Growers. The farmer or "local" may consign seed to the association to be cleaned and sold. An advance is then made of 50 per cent of the value. As soon as cleaned and placed in bonded warehouses the banks will loan up to 90 per cent of the value at 7 per cent interest. This enables them to finance the purchases until sold.

The wool exchange operates on lines similar to that of the Canadian Wool Growers, Limited. Wool is handled co-operatively through the farmers' clubs or other local organizations, shipped to a central warehouse, graded and sold to the highest bidder, the proceeds after paying necessary expenses being returned to the grower.

The work of the traffic department is to look after the adjustment of improper freight rates, overcharges, or anything else in connection with general freight

traffic has to do with the shipping from any organization in the state affiliated with the Bureau. As an example of their work, the Pere Marquette railway officials intended closing their railway line running into northern Michigan, which of course would have been a hardship to the shippers of that district. Through the efforts of the traffic department this road was kept running, thereby enabling the people of that district to ship out their produce.

The publicity department is the only one that is not self-sustaining, the others contributing towards its support. It is very far reaching in its work, which is really divided in two divisions, namely, legislative and educational. While they do not as a department openly discuss politics, yet, every public question pertaining to agricultural betterment is freely discussed from a neutral point of view. Educational work is carried on very extensively. Timely articles are presented showing the advantages of co-operation, giving the current wool prices, pointing out the work of the Farm Bureau and its value to the individual farmer, and generally bringing the work of the organized agricultural co-operative movements before the public mind. As the papers of the state which co-operate with the Department have over 1,500,000 circulation, a great many people are reached by the Bureau. Both the County Agents and the College Faculty contribute toward the press despatches.

The auditing department maintains a staff consisting of a manager and two assistants. Their duty is to audit the books of the various departments. They also assist all locals in establishing systems of records, audit books in case of financial difficulties, and help in any way they can to get them started in their work. A charge is made for services rendered sufficient to cover the expense of operating.

THE MICHIGAN FARM BUREAU EXCHANGES

By A. C. Knight, Agricultural Representative, Victoria County, Ontario

The Elevator Exchange

THIS exchange was started one and a half years ago with twenty locals. At the time of our visit one hundred elevators or shipping centres were doing business with the central exchange. Before becoming affiliated the officials of the shipping centre are required to sign a contract agreeing to sell their surplus through the Exchange, or pay the usual charge for such commodity. A fee of two hundred dollars is also charged each local. This fee may be paid in a lump sum or ten dollars per car until paid. The money so collected is held as a stock liability, and is returnable should the concern go out of business.

The Elevator Exchange sells beans, grain and hay, and cars are billed direct from shipping point to destination. The regular charge for beans is \$20 per car, 1½ cents per bushel on wheat, and ¾ cents on oats. Hay is sold on a straight commission basis. During the busy season as many as sixty cars have been handled in one day, and this year they expect to do a business of \$6,000,000. Last year they handled 800 cars of beans, or one-fifth of Michigan's output.

Advance payments are made to the locals by drawing on the banks against the bills of lading. Final settlement is made when returns are received from the shipment. Daily market reports are issued from head office advising locals when to ship, or when to hold as the case may be.

The charter of this exchange, as of all the others mentioned, will not allow them to sell for non co-operative concerns. Business is handled upon established trade rules, and any surplus is pro-rated back to the locals according to the business done. The manager receives a salary of \$10,000.

The Cadillac Potato Exchange

This is a separate organization composed of over 50 shipping centres controlled by the Cadillac Potato Growers' Association. Business is conducted in much the same way as with the Elevator Exchange, and there is a mutual agreement between the two concerns for selling potatoes. The Potato Exchange sells potatoes for the Elevator Exchange, and vice versa.

The Produce Exchange

This branch of the Bureau is located on the Detroit Eastern Market, and has been operating since June 1. With two locals shipping, the Exchange was paying its way. A charge of 5 per cent is made on eggs and poultry, and 10 per cent on fruit and vegetables. They also handle veal and dressed hogs. In time they expect to establish grades, and grade at the local shipping points. Each day's receipts are pooled.

The Live Stock Exchange

This Exchange is located in Detroit at the Stock Yards, which are owned by the Michigan Central Railway. They have been operating since May 1, and by June 15, controlled one-third of all the stock arriving at the yards. This progress was facilitated by the fact that there is very little f.o.b. buying in Michigan.

In order to get a start a commission firm was bought out, and their share of the yards taken over. They are classed as outlaws by the Commission Men's Association which will not admit them to membership.

The Exchange treats each shipping centre as an individual but sells each man's cattle according to the individual markings.

Charges for operating are as follows: For six cattle or more the rate is \$20

per car. A single deck of hogs or lambs \$14, and a double deck \$20. Where stock is delivered by wagon or truck the charge for cattle is \$1 per head, and for sheep or hogs 20 cents per head. These charges are the same as those made by the other firms doing business on the yards.

The Exchange so far has carried its own insurance on live-stock in transit. A charge of 5 cents per cwt. is made which has been sufficient to cover all losses, and is much cheaper than through the insurance companies. When stock arrives at the yards they are auto-

matically covered by a policy in the Hartford Company.

Like the Elevator Exchange and the other exchanges mentioned, any surplus accumulated is distributed to the locals according to the business done. They aim to charge enough to safely cover expenses, to pay good salaries to the best men available, and to cover anything required for emergencies. Any surplus over these legitimate charges goes back to the producer. As one of the managers put it. "We are working for the farmer, not working him."

IMPRESSIONS FROM A TRIP THROUGH THE STATE OF MICHIGAN

By W. P. Macdonald, Agricultural Representative, Lambton County, Ontario

THE farmer of Eastern and Central Ontario is astonished to see the variation in farming conditions, methods and type of farming, soils and topography of the country, when he has an opportunity to visit the southwestern counties of the Province of Ontario. To continue the journey westward across the State of Michigan will also bring forth many surprises. The St. Clair river, Lake St. Clair and the Detroit river, not only separate the State and the Province, but on the east and west side of these waters a different type of farming is followed and the topography of the country is entirely changed.

The well-known flat, prairie-like areas of Western Ontario are not to be found when crossing into the State of Michigan. This state having probably formed a shore line when the deep alluvial soils of Western Ontario were being laid down as a lake bottom. The absence of herds of cattle, especially beef cattle, roaming the pastures is practically the first observation the Ontario visitor would make. Dairy farming is principally followed on all "mixed" farms. Holstein cattle were in the majority on

the farms, but there are many fine herds of Ayrshire and Jersey cattle. The feeding and finishing of heavy beef steers, as practiced in Huron, Middlesex and Lambton counties, is not followed by the Michigan farmer in his farm practices. There were comparatively few cattle to be seen anywhere in our tour. Grain crops were more in evidence than clovers. Rye, beans and oats and small areas of fall wheat were the principal crops. Fields had not the well-kept appearance of Ontario. The lighter, sandy soil of the state may account for a large preponderance of weeds.

The methods of farming practised did not impress me as being so universally thorough as in Ontario. On the whole, conditions around the Michigan farm homes and buildings appeared prosperous. Abundance of paint is almost universally used. At least 90 per cent of the farm buildings are painted and, in the majority of cases, the name of the farm and the owner appears on the barn.

A feature of a great many barns is a large open shed or "lean-to" each side of the barn. These sheds are used

for the feeding of sheep. The Ontario farmer is a feeder of cattle. These sheep and lambs are purchased on the western markets by the Michigan farmer in car lots and fed for market. It was learned that in some cases the feeders contract with the western ranches for their lamb crop months before the lambing season.

The Michigan farmer is given more to specializing in crops than the Ontario farmer. Visits were made to farms where the production of rye or beans was the chief farm operation. The conservative spirit of the Ontario farmer is not so prevalent in Michigan. There are many large-scale farmers. Fifty to one-hundred-acre fields of potatoes were not uncommon. One farmer visited had 125 acres in green peas, all harvested in the pods and sold by the bushel on the Detroit market. Following close after peas was 125 acres of green corn to be harvested and marketed by the dozen ears. These crops formed this farmer's early cash crops, together with tomatoes. The main business of this farm was the production of improved seed.

The road system of the State of Michigan is a great deal in advance of the Province of Ontario. The perfect condition and the number of state highways is very noticeable to an Ontario visitor. These highways are a large per cent concrete and asphalt pavement. Where traffic does not demand pave-

ment, gravel is being used. A noticeable fact on the gravel roads is the amount of loose gravel surfacing the whole road. This gravel is not piled yards deep in the centre of the road but is spread out thinly all over the road, thereby not acting as a hindrance to motor travel but giving sufficient gravel for a proper levelling and filling for the successful work of the road-drags or planes. Road building is being vigorously carried on by state and county systems. The motor car is more in evidence on Michigan rural roads than in Ontario. A horse and buggy was seldom seen on a Michigan road in a week's travel.

An Ontario agriculturist's visit to Michigan would not be complete without a visit to the State Agricultural College at Lansing. The College farm is a fair representative of soil conditions of the portion of the state which we visited—a light sandy soil with smaller areas of a more loamy nature. The Farm and College departments for demonstration, experiment and investigation were quite similar to those of the Ontario Agricultural College.

The Michigan State Farm Bureau, with headquarters in Lansing, is a state farmer organization worthy of the investigation of the Ontario farmer. The Farm Bureau methods of improving the marketing conditions of the farm products of the state are bringing good results.

GIRLS' CLUB WEEK IN MANITOBA

BY S. T. NEWTON, SUPERINTENDENT, EXTENSION SERVICE

THE Manitoba Girls' Club Week held in Winnipeg from September 4-9, was a big success. Forty-five Manitoba Demonstration Teams, each with three members, and three United States teams, two with two members and one with three members, were present throughout the week. A full programme of sightsee-

ing and entertainment was provided, but the main feature of the week's programme was the annual competition to decide the champion demonstration teams of the Province.

In order that the Manitoba girls might get some idea as to how their work compared with that done in the United States, arrangements were

THE AGRICULTURAL GAZETTE OF CANADA

made for the champion demonstration teams from the states of Iowa, Minnesota and North Dakota to come to Manitoba and put on their regular championship demonstrations. As the Minnesota team was first last year at Sioux City and Iowa second in an interstate competition where the champion teams from twelve states were competing, Manitoba considered it a distinct honour to have the privilege of listening to the very best demonstration teams on the continent.

Among the subjects on which demonstrations were given were the following: Bread Making; Quick Breads; Macaroni; Milk Products; Beverages; Table setting; Vegetables; Canning; Care of the Baby; First Aid; Attractive collars and cuffs; comfortable footwear; The Model Kitchen; Art needlework; Sewing; Textiles, and Garment Dyeing.

Each demonstration occupied from 35 to 45 minutes, during which time one or other of the members of the



Girls' Club Week in Manitoba: The visiting champion Demonstration teams from Iowa, Minnesota and North Dakota are shown above, together with the Pilot Mound, Man., bread-baking team, which secured the highest score during the week in the Manitoba contest.

The competition in Manitoba has been particularly keen. Several teams having commenced work on their demonstrations nearly a year ago with the result that the quality of the demonstrations given surpassed all expectations and competent critics felt that the Manitoba high scoring teams compared very favourably with the visitors; in fact the highest score made during the week was credited to the Pilot Mound Bread Baking Team.

team was discussing in carefully prepared language the salient points of the subject while the other two members were performing the various mechanical operations connected with the subject.

Not infrequently questions were asked either by the judges or some one in the audience, and the ease in which the questions were answered showed that the girls were thorough masters of their subject.

The judges were Miss Josephine Arnquist, Girls' Leader for the State of Iowa, Miss Julia O. Newton, Home Demonstration Agent Leader for Minnesota, and Miss Margaret Speechley of the Manitoba Agricultural College, Winnipeg.

The trip to Winnipeg of so many of the girls who had achieved success in their own district was made possible through the co-operation of The T. Eaton Co., The Western Canada and Lake-of-the-Woods Milling Companies, The Junior Red Cross, and the Winnipeg Teachers, with the Manitoba De-

partment of Agriculture. Each of these organizations asked that the work be continued in 1923, as they considered it the finest kind of community work yet attempted for the purpose of developing interest in better homemaking and in more approved methods of farming.

This year there was one boys' demonstration team, trained by W. R. Leslie of the Morden Experimental Farm. They made such a good showing that next year it is confidently expected there will be at least twenty-five boys' teams.

"FIELD DAYS" IN SASKATCHEWAN

IN Saskatchewan agricultural meetings under the auspices of agricultural societies have usually been held in the towns, and almost invariably during the winter months. This year a new form of extension work was undertaken under the designation of "field days". The attempt was made to get as closely in touch with the farmers as possible by holding meetings at the homes of successful farmers and during the season when field crops were at their best. These gatherings were somewhat experimental and this year only two were held, but the consensus of opinion would indicate that these meetings will be very popular and productive of good results.

In choosing the location for the gathering or picnic, care was exercised to select the farm of a man who had made a success of farming and who was well liked in his community. In one instance a farm was chosen where there was a silo (the only one in the district), a herd of good Holstein cows, a milking machine, good buildings, and

considerable acreage sown to corn, sunflowers and sweet clover. The speakers made use of these features as they applied to the subjects dealt with.

The programme began at 3.30 p.m., and included addresses by the Minister of Agriculture, the Dairy Commissioner of the Department of Agriculture, and by representatives of the Field Husbandry and Animal Husbandry departments of the University of Saskatchewan. At six o'clock those present, numbering approximately 500 in one instance and 750 in the other, partook of a picnic supper, after which the programme of addresses continued for another hour.

The interest at both places was exceptionally keen and it is likely that such gatherings in somewhat modified form will become annual agricultural society events.

The meetings were organized by the Extension director of the University and arranged for by the local agricultural societies.

A SEED GRAIN MARKETING PLAN FOR ALBERTA

IN accordance with plans to encourage the production of pure seed on an extensive scale in the province of Alberta, the marketing of seed grain will be undertaken by the department of agriculture.

The plan involves not only the distribution of seed for production purposes as formerly, but contemplates also the establishment of a cleaning and grading plant at Edmonton, through which all seed grain to be marketed under the new plan will be handled, and further provides for the advancement to the farmers, on consignment of seed grain to the government plant, of sixty-five per cent of the commercial elevator price, with a certificate covering the balance. The seed will be sold to the best possible advantage and the balance, after expenses are deducted, will be paid to the growers.

It is anticipated that 100,000 bushels of seed grain of all varieties will be handled under the new scheme this

year. The handling and marketing is to be under the supervision of the field crop commissioner. In the marketing of the seed grain, the government will have regard first for the Alberta market, after which outside markets will be sought.

The field crops branch of the department of agriculture will inspect the growing grain produced from the registered seed supplied. Any farmer, however, who can satisfy the crops commissioner that he is growing seed grain eligible for registration, and can pass inspection of the commissioner, will have the opportunity of marketing his seed under the new government scheme.

Producers of good seed in the province will be encouraged to patronize the new marketing plan, under the conditions stipulated. It is emphasized that the individuality of the seed will not be lost at any stage, but retained throughout the whole marketing scheme.

PART III

Agricultural Education and Related Activities

AGRICULTURAL INSTRUCTION IN THE ELEMENTARY SCHOOLS

What is the aim or purpose of elementary agricultural instruction? Is it vocational or pre-vocational or simply educational? What success has attended its introduction in the schools? The accompanying articles give a résumé of the situation in three provinces, and it is hoped to continue the series in succeeding issues.—*Editor.*

BY F. W. BATES, M. Sc., DIRECTOR OF SCHOOL AGRICULTURE FOR SASKATCHEWAN

THE reasons assigned for placing Agriculture on the Elementary School curriculum are so many and so varied and the results obtained in actual practice so diverse that a re-statement of the whole case should be of interest at the present moment. Although much has been done it is yet too soon to reach a final conclusion as to the true value of elementary agricultural instruction nor is it fair to condemn it because of failure in presentation. After many years of experiment the teaching of arithmetic in our schools is far from satisfactory while grammar and history still prove stumbling blocks in the path of many otherwise successful teachers. In these subjects the range of material as well as the limits of the field are quite clearly defined. On the other hand, Agriculture is a growing science whose subject matter is constantly increasing since it draws on the whole field of experimental science. In addition it is a practice with frequent change of method and application. It is not strange therefore that the most extreme opinions as to its success and value as a public school subject should be held.

To discuss the problem adequately, the following points must be carefully considered. What is the aim or purpose of elementary agricultural instruction? Is it vocational or pre-vocational in the

accepted sense of those terms? Or is it simply educational? Then what range of work should be attempted and what methods employed in the presentation? Finally, what success has attended the effort and is it worth the time and energy expended?

In Saskatchewan, Agriculture has been a subject of study in the public school for many years but for the past seven years special efforts have been made to make the work more efficient. This article does not claim to deal with the general problem but rather to discuss what has been attempted in this province and to draw a few conclusions therefrom.

In the first place, the aim or purpose of the course is the development of a more efficient citizenship. It is not taught to keep boys and girls on the farm but it is believed that the education of our youth whether on the farm or in the town is incomplete without some knowledge of the part agriculture plays in human affairs. It is hoped that the wider knowledge thus acquired will tend to counteract the drift to the cities and result in a better balance in every phase of our national life. Agriculture, therefore, is included in our Course of Study because it is a basic industry in our civilization, not because Saskatchewan happens to be an agricultural province. The subject thus regarded can

THE AGRICULTURAL GAZETTE OF CANADA

scarcely be called vocational or even pre-vocational. It is simply educational.

From this standpoint, Agriculture cannot be treated in a technical way especially in the lower grades. It is more the attitude of mind that is of value than the material used. It implies the fullest use of the environment in teaching drawing, arithmetic, language, etc. The foundation of geography are laid in the study of convenient land and water forms and weather observations. The inter-relationship of plant and animal life gradually comes to view as the common living things are watched and studied. From the beginning, the natural inclinations of children to make collections, keep pets and work in the soil, are utilized in developing the powers of observation and expression.

Toward the middle period of the public school life, the work assumes a more practical phase with the introduction of school gardening. The purpose of the garden is not the growing of produce but the development of the child. Here, at first hand, he learns in some measure how to control the great processes of nature and achieves the joy of creation. The garden becomes a laboratory and the study of plant and animal life proceeds from a new angle.

In the upper grades the work assumes a scientific phase. The pupil draws conclusions from his own experience and that of other pupils. Laws are discovered and experiments devised for further and more thorough investigation. At this point a whole new range of study opens up. The relation of plant and animal life on the farm, the place of machinery, marketing, farm management and the more general problems of production come under review. Not only is the experience of the pupil studied but his information is organized and related information sought and incorporated.

What success has attended the effort? As far as examinations are an indica-

tion of success, progress is being made, but the greater and more important part of the work cannot be measured in this way. General conditions in the province do not favour the development of gardening on the school grounds but there is a constant increase in the use of the home plot. The school exhibition, while not essential to the course, serves to indicate what is taking place. Each year the quality of vegetables and grains exhibited improves, showing at least a better knowledge of standards and more careful selection. The projects conducted by the boys' and girls' Clubs, however, give the best indication of progress as here we find the school definitely linking its activities with the home life. The increase in the number of pupils engaged in this work is quite gratifying when it is remembered that no grants are paid by the department and all expenditures must be borne locally.

As in all phases of school work, the ultimate success depends on the teacher. It is gratifying to note that an increasing number of teachers realize the true place of agriculture as a school study and are doing everything in their power to give the boys and girls a better appreciation of this great fundamental industry.

The value of such a course cannot be easily determined. Its success cannot be measured from the practical standpoint since it does not attempt to train in the practice of farming, neither can it be seen in the development of scientific farmers. Its effect must be sought in the better relationships between town and country, in the appreciation of the great place agriculture plays in human life and in the widespread acceptance of agriculture as an occupation worthy of the best brains and training in the community. To determine whether this ideal is being achieved requires time and it is yet too soon to attempt an answer.

The portion of the Agricultural Instruction Grant allotted to the Sas-

katchewan Department of Education has been expended in the training of teachers and in giving personal guidance and assistance in the development of every phase of activity which will make the course more efficient. As

noted above, no grants are given in the Elementary schools either to teachers or schools doing the work or toward the conduct of school fairs. Consequently, what progress has been made is natural and it is hoped of permanent value.

BY R. G. VAUGHAN, DIRECTOR OF TECHNICAL EDUCATION, MANITOBA

AGRICULTURAL education as carried on in Manitoba is of two distinct types, (1) Vocational, technical in nature and taught to those who intend to profit by such instruction through farm operation or technical positions in professional agriculture; (2) General, scientific and social in nature, indispensable in any well-rounded educational programme for a country whose basic industry is agriculture.

It is with this general type that the public schools are mostly concerned. It is now conceded that a socialized curriculum necessarily includes participation in the industrial and agricultural life of the people, with such participation carried on in a spirit conforming to the age of the students, with special reference to their interest and ability, and possessing the greatest common factor of general, useful knowledge.

The most popular and we believe the most efficient method of embodying agricultural experience in the elementary schools is through the organizations of boys and girls clubs carried on co-operatively by the Departments of Agriculture and Education, the field administration being mainly in the hands of the Department of Education through the inspectors, supervisors and school principals with the details of outlines for study projects, demonstration teams, etc., being worked out by agricultural specialist. The value of having the work carried on by this method is that it becomes a community project in each district, all local organizations taking a part in its management and assisting financially and administratively in making the work of the club a

success. The children are carrying on agricultural work along methods approved in scientific agriculture assisted and encouraged by their teachers and agricultural specialists, exhibiting results of their work and learning by experience and observation that intelligence, judgment and method, plus application, are prime factors in their relative standing in the community, and that agricultural education is of interest, of value and a mark of social approval rather than a task imposed. This work involves home projects in poultry, live stock, horticulture, field crops, cooking, canning, dyeing, and any other subject relating to the lives of agriculturalists.

The demonstration team has been one method of illustrating the value of proper methods in the agricultural work and makes its appeal through being conducted by students of school age. The fairs, held in the early fall, combine school work and home work, teacher, student and parent in the spirit of competition with a desire for relative individual progress. They thus take an interest in agriculture as a matter of national concern and by actual participation in a social movement gain some idea of their relative position in the economic structure of the country rather than gaining only a little information as a side issue. In the elementary grades of our public schools the children are not old enough to study from a purely personal vocational standpoint.

In the secondary schools agriculture has been carried on in a limited number of schools a half day per week through grades IX, X and XI, and is recognized

THE AGRICULTURAL GAZETTE OF CANADA

by the Department of Education and the University as part of the secondary school courses either for preparation for Normal School or University. The work covers Horticulture and Entomology in Grade IX, Botany and Field Crops in Grade X and Live Stock (including Poultry) in Grade XI.

Beginning in September 1922, provision will be made in two or three schools to modify the course of study in these schools to replace the botany and elementary science so that, for those taking the agricultural work in high schools, the botany will be included in the course and be of a practical nature directly applied: their Entomology for example, will be devoted particularly to insects of economic importance. The aim is to increase the value of the work by direct application without losing any values included in the work for which it is substituted.

There is room for agricultural winter courses in many of our high schools to which the older boys could come and take work similar to the diploma course given at the Agricultural Colleges, but their work would be more vocational and including only the required citizenship courses in addition to the agricul-

tural work taken up. Several courses such as these have been carried on in the agricultural centres here previous to the war.

In regard to the Boys' and Girls' Clubs, we feel that it has had favourable opportunity and has been well worth while. The fact that over thirty thousand boys and girls are now included in the membership list gives evidence that it is favourably received in the country. The finances for carrying on the fairs, etc., are raised very largely through local contributions. On the whole the result has been very satisfactory; any difficulties encountered have been due chiefly to local reasons.

With reference to agricultural work in secondary schools we feel that this will be a distinct advantage to our secondary school course. It will be necessary to secure teachers well trained in agriculture as well as in other subjects to get the greatest value from this plan, but it should be taken as part of a general education. To make the work of winter courses in rural schools a permanent feature, credit for the work covered will need to be given by institutions carrying on agricultural education.

BY DR. J. B. DANDENO, INSPECTOR, ELEMENTARY AGRICULTURAL CLASSES, ONTARIO

IN the Public and Separate schools of Ontario agricultural instruction is given, in a regular way, in about 2,000 schools. As the subject is entirely optional, it might be inferred that whatever progress has been made is likely to be reasonably permanent. In these schools, agriculture can not be considered vocational excepting incidentally. In fact it may be said to be non-vocational.

From our experience in Ontario we can say with some degree of assurance that non-vocational agriculture is the only kind that will take a permanent hold upon the schools, and for two reasons: (1) At the age in which such instruction is given—namely from

eleven to fourteen or fifteen—the vocational aspect can not materially enter. Very few persons at such an age will be able to decide the matter of a vocation even if the inclination to do so had already taken a hold upon the individual, which, in the vast majority of cases, it has not. (2) Vocational agriculture will never find much support in our scheme of education, so far as the primary or secondary schools are concerned, for the simple reason that, with the average boy, such education can lead only to the position of hired man. The capital required to start business as a farmer is too great. To expect a boy to enter enthusiastically upon a course which leads only to a

position as hired man, is expecting more than will be realized. Agricultural education, or better still, educational agriculture, is not vocational in Ontario.

Is non-vocational agriculture worth while? Let me point out the advantages as far as our experience goes: (1) Boys and girls gain a new viewpoint with respect to the occupation of farming, and, therefore, are inclined to look with more respect upon such occupation, consequently there is less inclination to leave the farm. (2) Education in other respects becomes more real—History becomes more interesting when associated with the origin of our breeds of farm animals, with the Noxious Weed Act, with the warfare with insect pests; Geography means more when the study of soil and climate is associated with the growing of wheat, clover, or tomatoes; Arithmetic will not prove such a difficult subject when problems and calculations arise out of school or home garden, or out of other matters with which the pupil has had a personal contact; Art is real art in the making of a neat garden, lawn, or window box; Language is more effective when relating to the work of the day or of the experiences at home; the rudiments of science have their best foundation in elementary agriculture.

The evidences to support these statements are, perhaps, not as tangible as one might expect, but they are none the less real. A visit to those schools which have been carrying on classes in agriculture for some time will show the thoughtful observer that an important movement is operating.

In Ontario agriculture is not called rural science, it is called agriculture and the subject is made as real as possible. Rural science (but there is no such thing any more than there is urban science, or metropolitan science, or Saskatchewan science, or Yukon science, or international science) would tend

to defeat the end we are aiming at. It tends to lead in too many different directions, when we want to lead in one direction. Some consider rural science a sort of camouflage to cover a multitude of subjects, the word "rural" intended to catch the eye of those from the country, and the word "science" to dignify it by giving it a name to which educationists will not object. To my mind, the use of this term has had something to do with the question which has just been raised,—“Is non-vocational agricultural teaching in the public schools proving worth while?” To ask such a question of those concerned with the teaching of agriculture in the Public Schools of Ontario would be almost like asking if it were worth while to waste food by taking physical exercise.

High Schools—Vocational agriculture in High Schools has not had a fair trial in Ontario because such instruction receives no recognition by the higher institutions of learning. It is not recognized by these institutions as education. No recognition is given, nor is likely to be given, to vocational agriculture on the matriculation examination. Moreover, as has been mentioned in connection with public schools, vocational agriculture leads only to a job as hired man. It can hardly even be called a trade.

Non-vocational agriculture is now provided for in the High Schools of Ontario and recognition is given on matriculation examination. This has been in operation, however, for only one year, hence little can be said about the results.

Of course, agricultural education as we have it in Ontario is necessarily, to a certain extent, vocational. This was shown during the war. It was quite apparent then that the instruction given was readily adaptable to the production of food. The schools at once took hold, and, through the efforts of teachers and pupils, material assistance

THE AGRICULTURAL GAZETTE OF CANADA

was rendered to the nation. Eggs, poultry, potatoes, beans, etc., were produced and without any material added cost. The pupils took hold with enthusiasm not less than the soldiers in the firing line. In fact, they considered

themselves a part of the army. They learned a certain amount of real war history as they could have learned in no other way. If war were declared tomorrow, this army for production is ready.

PART IV

Special Contributions, Reports of Agricultural Organizations, Publications and Notes

THE PASTEURIZATION PROCESS AND ITS EFFECT ON THE VITAMIN CONTENT OF MILK

BY A. BRUCE MACALLUM, M. D., Ph. D.

WITH the advancement of knowledge in dealing with epidemic diseases and infective organisms brought into the system by means of the food supply, special attention has always been devoted to the preparation of milk which shall be relatively free from pathogenic forms of infection. The various agencies by which milk can be infected—the cow, the stables, attendants, in transportation and subsequent delivery—are not within practical methods of control, especially in such large units of population as our cities, while the distance from the point of origin to the ultimate consumer may often be over a hundred miles; therefore, some means must be taken to render milk more or less clean from a bacteriological standpoint before delivery to the consumer.

The method almost universally adopted by the large milk distributing plants in American and Canadian cities and towns is that known as the pasteurizing process. It derived its name from the fact that Pasteur found that it was unnecessary to kill all the organisms in milk to keep it fresh, but that a moderate degree of heating would kill practically all the putrefactive and fermentative organisms. The term is employed in commercial dairy practice to include all processes by which the milk is heated from 130 to 180° F. for periods of twenty minutes to half an hour. While this process improves the keeping qualities of milk, at the same time it does not produce chemical changes which

may damage the nutritive qualities of some of the principal constituents, which result from sterilization by means of boiling. It must be borne in mind that pasteurized milk may contain dangerous organisms, yet practical experience has so well proven the many benefits derived from its use in infant feeding that it is universally recommended by hygienists and all modern milk distributing plants pasteurize milk which is specially prepared for infants.

Milk as intended by nature should contain all the essential elements of a complete diet for the adolescent mammal. It should, therefore, in its natural state, contain all the vitamins which have been found essential for the growth and maintenance of life of the young; but the vitamin content will again depend on the diet of the cow, since neither the mammary gland nor any other maternal tissue can synthesize these compounds. It must be emphasized here that in this regard milk does not exhibit any uniformity; that is, equal volumes of milk from different sources do not necessarily have the same proportions of these accessory factors, but they will vary in proportion to the amounts present in the diet of the cow, which also exhibits a variation in vitamin content of a seasonal nature. Again, milks from different sources may show considerable differences since Osborne and Mendel (1) found that the milk employed by them in their experiments was much lower in its vitamin content than that used by Hopkins since they had to use

four to six times the quantity to get the same effect on their growth curves. While all the vitamins are present, the fat soluble, water soluble and antiscorbutic factors, these also may exhibit variations in respect to each other which are referable back to the diet of the animal in question. As a general rule raw milk usually is well supplied with the water and fat soluble factors but wide variations in the amount of the antiscorbutic element must usually be expected and discounted in advance by the paediatrician.

Taking into consideration the possible effect of the pasteurizing processes upon the vitamin content, there are three possible factors, reaction of the milk, oxidation and heat, which may exert a destructive influence upon these essential elements. In the first place the reaction of the solvent medium is of some importance since the degree of destruction by pasteurization will be negligible when the reaction is neutral or acid and accentuated when it goes over to the alkaline ranges of pH concentration. Milk, however, is amphoteric in reaction and the alkaline range found in milks in practice is usually not sufficient to produce any noticeable effect on the water soluble factor since this is found apparently unimpaired in milks which have been heated to boiling or even undergone desiccation; and milk which has been heated to 120° for an hour will still display its close approximation to its original antineuritic value (2). In so far as these experiments on guinea pigs are of any value in their application to the practical side of the milk problem, one can be fairly safe in assuming that pasteurization has no appreciable effect on the water soluble or antineuritic factor.

In the case of the fat soluble vitamin the amount present will vary with the ration of fresh green food or bran consumed by the cow, but the average quality of milk distributed in this continent is quite adequate in its content of this essential element. While no actual ex-

periments upon milk itself have been carried out, it has been found that concentrated preparations of this vitamin made from butter fat and cod liver oil can stand the action of live steam for several hours; (3) and autoclaved milk will also display considerable activity in regard to the fat soluble factor in satisfying the requirements of guinea pigs (2). Subsequent experiments have shown that atmospheric oxygen combined with various degrees of heating is the destructive agency responsible for the diminution of this particular vitamin; since butter can be heated in an autoclave to 120° for several hours and remain unaffected, but deterioration takes place if the butter fat is heated and aerated. Pasteurization in a closed container therefore should exert no appreciable damage on the physiologic activity of the fat soluble element.

Milk as an antiscorbutic on the other hand shows wide variation in its protective power, even when fresh, and failure to recognize this fact is responsible for much of the conflicting clinical evidence concerning the respective virtues of raw and pasteurized milk in the prevention of infantile scurvy. That such a variation could exist was known as far back as the middle of the last century when Curran (5) noted the outbreak of scorbutic symptoms where 1 pint of raw milk was included in the daily ration over a period of five to seven months. Further experimental evidence on the point has recently been furnished by the study of experimental scurvy upon guinea pigs. The results obtained in this manner show that in addition to the stock diet of oats, bran, water and autoclaved milk, quantities from 50-100 cc. of fresh raw milk daily exerted only a partial antiscorbutic effect and a minimum of 100 cc. per diem was necessary to produce a definite protection against the development of scurvy (6). A similar result has been obtained in the case of monkeys where a large quantity of fresh raw milk, upwards of 100 cc. daily, was needed to prevent the

onset of this disease. In both cases such a quantity would practically confine the diet solely to milk to get the fully protective effect, a condition practicable only in the case of infants, where the diet is exclusively confined to milk, and in this latter case Hess (7) places the minimum at 500 cc. per diem in order to provide a reasonable margin of safety. Another factor in causing variation in the antiscorbutic vitamin of milk is the effect of the seasonal variation of the diet. Since the antiscorbutic vitamin is found in the green fresh vegetables, leaves and grasses, the summer milk would be more powerful in its antiscorbutic effect than the winter milk, when the diet would consist largely of dried stored foodstuffs of low antiscorbutic value. Hart and his collaborators (8) in a series of studies upon experiment scurvy in guinea pigs found that 50 cc. of milk produced during the summer had the same protective capacity as 75 cc. of milk obtained when cows were upon winter rations. In another series of experiments of this type (9) the milk of cows consuming a dried ration was markedly defective in its antiscorbutic power, but improved and reached a maximum when the animals were placed on pasturage for several weeks. Subsequent research upon the protective power of milk powders has demonstrated that those prepared from milk of cows fed upon summer rations are of higher quality than those prepared from milk produced during the winter months (8).

Turning to the consideration of the effects of pasteurization upon the antiscorbutic vitamin, it has been found by actual experiment that in the case of cabbages heating in water at 140° C for one hour had destroyed 70 per cent of the antiscorbutic vitamin originally present. This is comparable to the effect that the pasteurization process would produce in milk and this furnishes an example of the possible extent of the damage. The question of the role of pasteurization of milk in the production of infantile scurvy has been a question

of much dispute by clinicians in the past and a survey of the literature on this disease by one of the authorities (10) would seem to indicate that this method of treating the milk was responsible for the outbreaks in a great many cases. The most significant evidence is furnished by the experience of Hess (11) who reported cases of subacute infantile scurvy which developed in a series of cases in a large paediatric clinic. These had been furnished with a milk diet pasteurized at 165° F for thirty minutes. The cases required seven to nine months for the symptoms to appear and then only in a mild form. The diagnosis of subacute scurvy was confirmed when the symptoms disappeared after the administration of a raw milk diet. A subsequent series of cases developed when the pasteurization was carried out at a lower temperature (145° F). Some months after the installation of a pasteurization plant at a large dairy in Berlin a series of cases of infantile scurvy developed and an investigation fixed the responsibility upon the pasteurizing process. After this was discontinued the epidemic declined and a normal state of affairs ensued. Hess has called attention to the fact that milk pasteurized in the home by the small domestic installations was of greater antiscorbutic capacity than milk so treated in large institutions or large dairy plants. He attributes the difference in the latter case to the storage before use after the pasteurization and the mechanical treatment involved in the commercial process. Forty-eight hours after the treatment the antiscorbutic power had declined over the index found at immediately after pasteurization. He goes so far as to state that "Raw milk must not be considered as having potent antiscorbutic properties," (13). Again "in numerous communications published during the last few years, we have laid emphasis on the fact that pasteurized milk possesses still less antiscorbutic power than raw milk; that, indeed it is not sufficiently rich in this 'vitamin' "

to allow a positive balance to be maintained, so that infants fed for a considerable period on pasteurized milk develop a mild type of scurvy. We wish to point out again that this deficiency of pasteurized milk is due only in part to its having been heated, that much of the antiscorbutic factor is lost subsequent to the heating in the course of handling and ageing of milk so that pasteurized milk contains considerably less of the vitamin factor after forty-eight hours than it did immediately subsequent to heating—. It is probably exceptional for a well marked case of scurvy to develop on a diet of pasteurized milk, for enough of the protective substance remains to avert this disaster."

Pasteurization has repeatedly demonstrated, by the beneficial results following its adoption, in the bacteriological control of the milk, that it would not be expedient to sacrifice this all-important gain for the doubtful advantage of preserving unimpaired a trace of the antiscorbutic vitamin. When milk is employed as the sole diet for infant feeding some extraneous source of the antiscorbutic element must be provided. The fruits of the citrus type furnish abundant supplies of this important material and orange or lemon juice should be administered. It can be given to infants one month old, and the routine practice is to give a teaspoonful diluted with water, and sugar added, if it is tart. It has the advantage that it can be given even where there is a tendency to diarrhoea. When the stomach is unable to stand the acidity of the juice, it can be rendered alkaline with lime water or baking soda immediately before use. A cheaper source of the antiscorbutic factor has been suggested by Hess in the form of the juice of canned tomato which in spite of the canning process and subsequent prolonged storage has demonstrated a fair protective capacity. The juice is strained off and two tablespoons per diem for babies over three months old is the routine dosage. Practical experience has shown that it is well toler-

ated by the infants. The juice of the swede turnip (14) prepared by grating the raw vegetable and squeezing the pulp with the fingers yields a juice of fair potency but must be prepared fresh daily. It is given in quantities of two tablespoonfuls at a dose and is now used in several infant clinics in England as a routine measure in the prophylaxis of scurvy.

Since pasteurization of the milk supplies for infant feeding is almost universal in America, steps should be taken to warn the public of the possible dangers that may follow its exclusive use. At the same time the measures taken to remedy the antiscorbutic deficiency outlined in the preceding paragraph should be encouraged through the agency of the Child Welfare Clinics and educational campaigns by the public health authorities, for it is in this manner that the users can be furnished with a milk safe from a bacteriological view and fortified in its antiscorbutic power by extraneous sources of this vitamin.

- (1) Osborne & Mendel, *J. Biol. Chem.*, XXXIV, 537.
- (2) Delf-Biochem, *J.* XII, 416.
- (3) Osborne & Mendel, *J. Biol. Chem.*, XVI, 423.
- (4) Hopkins *Biochem. J.* XIV, 720.
- (5) Curran, *Dublin J. Med. Sciences*, VII, 83.
- (6) Chick Herne & Skelton *Biochem. J.* XII, 131.
- (7) Hess, *Scurvy, Past & Present*, p. 238.
- (8) Hart Starboch & Ellis, *J. Biochem.*, XLII, 383.
- (9) Hess Unger & Supplee, *J. Biochem.*, XLV, 231.
- (10) Lane, Claypon, *Milk and its hygenic relations.*
- (11) Hess, *Scurvy Past and Present.*
- (12) Neumann *Deut. Mech. Woch.*, XXVIII, 628.
- (13) Hess & Unger, *Am. J. Dis. Children* XVII, 221.
- (14) Chick & Rhodes, *Lancet*, Dec. 7, 1918.

THE AGRICULTURAL GAZETTE OF CANADA

DAIRY PRODUCTS, PRODUCTION AND VALUE

Table I shows the production and value of creamery butter in Canada by provinces for the year 1921 as compared with 1920.

I. QUANTITY AND VALUE OF CREAMERY BUTTER IN CANADA, BY PROVINCES, 1920 AND 1921

Province	1920		1921	
	Quantity	Value	Quantity	Value
	lbs.	\$	lbs.	\$
Prince Edward Island	1,166,032	674,744	1,109,546	452,523
Nova Scotia	2,503,188	1,518,757	3,094,768	1,306,465
New Brunswick	1,053,649	606,891	1,152,168	475,112
Quebec	41,632,511	23,580,949	42,575,392	15,431,962
Ontario	37,234,998	21,343,858	43,525,742	16,665,277
Manitoba	7,578,549	4,282,731	8,541,095	3,253,057
Saskatchewan	6,638,656	3,727,140	7,030,053	2,552,698
Alberta	11,821,291	6,555,509	12,929,264	4,478,585
British Columbia	2,062,844	1,334,624	2,818,552	1,277,409
Total for Canada	111,691,718	63,625,203	122,776,580	45,893,088

Table II shows the production and value of factory cheese in Canada by provinces for the year 1921, as compared with 1920.

II. QUANTITY AND VALUE OF FACTORY CHEESE IN CANADA, BY PROVINCES, 1920 AND 1921

Province	1920		1921	
	Quantity	Value	Quantity	Value
	lbs.	\$	lbs.	\$
Prince Edward Island	2,081,277	525,635	1,681,779	293,651
Nova Scotia	52,638	14,865	29,440	5,578
New Brunswick	1,235,008	336,409	1,100,382	203,941
Quebec	52,162,777	13,372,250	53,525,706	9,188,983
Ontario	92,784,757	24,605,823	103,135,613	18,604,766
Manitoba	116,229	31,611	255,829	47,341
Saskatchewan	28,367	7,790	22,659	4,209
Alberta	398,750	110,355	889,904	186,175
British Columbia	342,053	96,134	421,314	80,541
Total for Canada	149,201,856	39,100,872	161,062,626	28,615,185

Table III shows the quantity and value of the principal products of condenseries for 1920 and 1921.

III. PRODUCTION AND VALUE OF CONDENSED PRODUCTS IN CANADA, 1920 AND 1921

Kind	1920		1921	
	Quantity	Value	Quantity	Value
	lbs.	\$	lbs.	\$
Condensed milk	53,662,699	10,202,230	39,101,243	5,844,333
Evaporated milk	30,469,642	3,809,653	31,202,713	3,428,456
Skim condensed milk	363,294	18,723	1,096,006	39,082
Milk powder	7,574,668	2,178,176	1,493,909	492,042
Skim milk powder			5,012,700	811,006
Sterilized milk	7,608,927	785,044	6,696,264	719,009
Casein	109,958	19,233	98,136	9,814

THE AGRICULTURAL GAZETTE OF CANADA

Table IV gives, by provinces, for the five years for which the statistics are available, viz. 1917 to 1921, the total value of all the products of dairy factories.

IV. TOTAL VALUE OF ALL PRODUCTS OF DAIRY FACTORIES BY PROVINCES, 1917-21

Province	1917	1918	1919	1920	1921
	\$	\$	\$	\$	\$
Prince Edward Island	702,334	855,374	1,184,163	1,252,013	792,299
Nova Scotia	1,171,376	1,423,451	1,974,269	2,517,338	2,002,406
New Brunswick	589,235	768,034	1,167,256	1,196,354	897,288
Quebec	28,358,876	31,033,944	36,790,037	37,732,572	25,174,136
Ontario	48,720,706	54,785,716	69,897,519	75,926,248	49,865,759
Manitoba	4,124,190	6,119,219	7,042,646	7,788,178	5,066,015
Saskatchewan	2,375,399	3,261,222	5,042,377	5,536,245	4,197,808
Alberta	5,247,343	5,550,583	7,872,541	8,838,298	6,439,095
British Columbia	2,529,867	3,543,307	4,225,794	5,549,245	4,773,048
Total for Canada	93,879,326	107,340,850	135,196,602	146,336,491	110,207,854

NEWS ITEMS AND NOTES

From April to October 1924, a British Empire Exhibition will be held in London, England. A British Mission headed by Major E. A. Belcher is visiting Canada to explain the purposes of the Exhibition and to impress upon this country the opportunity of placing before the world evidence of her great resources and the products of her farms, forests and factories.

In 1921, eighty-six Illustration Stations were conducted under the Dominion Experimental Farm system, namely, eight in British Columbia, twelve in Alberta, twelve in Saskatchewan, thirty-two in Quebec, ten in New Brunswick, and twelve in Nova Scotia. Three additional stations were selected in British Columbia and in Saskatchewan for cropping in 1922. In the conducting of these stations, farmers set aside certain areas for demonstration purposes and undertake to co-operate with the officers of the division in the methods of cultivation adopted. It is not only to the soil and crops that attention is devoted, but the dairy herd and poultry also come in for consideration. Special efforts are made in the restoration of the soil, in the introduction of new crops and increased production by the old ones, in illustrating the value of good, pure seed, in showing the importance of keeping farm accounts, in demonstrating the benefits derived from the systematic rotation of crops, in the growing of clover seed, in proving the value of drainage, in encouraging the growing of corn, in methods of growing

and harvesting sunflowers, in summer fallow treatment, in the growing of alfalfa, in encouraging the production of fall rye, in the cultivation of a farm garden, and, in short, in helping and aiding in anything likely to result in an increase of information and of profit.

At a conference of shipping interests at Ottawa it was pointed out that, in the event of a store cattle trade being revived with Great Britain consequent upon the removal of the existing embargo, the absence of horns on cattle would be a great commercial asset to the Canadian farmer. Methods of dehorning are given in bulletin No. 15, "Dehorn your Commercial Cattle," which may be obtained on application to the Publications Branch of the Department of Agriculture at Ottawa.

The United States Department of Agriculture reports a survey of three representative areas in Indiana, Illinois and Iowa. It is shown that farmers with a college education received an average labor income of \$463 more a year than the man with a high school education, and \$979 more a year than the man with only a common school education.

Statistics furnished by the Dominion Department of Agriculture show that there were over 500,000 more milk cows in Canada in 1921 than in 1920, 400,000 more other cattle, 45,000 fewer sheep, nearly 400,000 more swine, and 6,600,000 more poultry.

Average values were much less last year than in the year before, dairy cows being placed at \$51 against \$80, other cattle at \$28 against \$47, sheep \$6 against \$10, swine \$14 against \$23, and poultry, \$1.02 against \$1.21.

The Dominion Bureau of Statistics issued on June 1, 1922, a preliminary statement of the production of the dairy factories of Canada for the year 1921, as compared with the final report for 1920.

The statement shows that the total quantity of creamery butter produced in Canada in 1921 was 122,776,580 lbs. of the value of \$45,893,088, as compared with 111,691,718 lbs. of the value of \$63,625,203 in 1920, an increase in quantity of 11,084,862 lbs., or 10 p.c., and a decrease in value of \$17,732,111, or 28 p.c. The decrease in value was caused by a lower average price per lb., which dropped from 56c. in 1920 to 37c. in 1921.

According to the Fourteenth Annual Report of the Canadian Record of Performance for Pure Bred Dairy Cows, the number of cows that have qualified in the Record of Performance with records of 10,000 lbs. milk or over, is shown to have been 3,227 up to April 1, 1922. Given by breeds the figures are as follows:—Holstein-Friesian, 2,368; Ayrshire, 594; Jersey, 150; Shorthorn, 90; Guernsey, 16; French Canadian, 9.

It is interesting to note the business in dairy products that Canada does with the British West Indies and other British colonies as told in the News Letter of the Dominion Dairy and Cold Storage branch. To Bermuda in May of this year was shipped from this country 8,742 lb. of butter and 50 hundredweight of cheese; to British Honduras 731 lb. of butter, 6 hundredweight of cheese and 464 hundredweight of condensed, canned or preserved milk; to the British West Indies (Barbados, Jamaica, Trinidad, Tobago, and other islands) 32,614 lb. of butter, 519 hundredweight of cheese, 1,662 hundredweight of condensed, canned or preserved milk and 1,171 lb. of powdered milk; to British Guiana, 1,070 lb. of butter, 68 hundredweight of cheese, and 25 hundredweight of condensed, canned or preserved milk; and to Newfoundland, 21,270 lb. of butter, 371 hundredweight of cheese, and 246 hundredweight of condensed, canned or preserved milk. In addition small quantities of some of these products were exported to South Africa, China, Japan, St. Pierre and Miquelon, Costa Rica, Peru, Mexico, and Russia.

The Dominion Dairy and Cold Storage Commissioner, Mr. J. A. Ruddick, fresh from a trip across the seas, in noting the arrival at Liverpool of the largest single ship-load of butter ever sent from this country,

namely 50,000 boxes, says that the chief complaint in England regarding Canadian butter is that it is over-salted, and that the demand is for mild butter. As the makers cannot tell whether their butter is for export or home consumption, it is urged as a solution of the difficulty that Canadian consumers be led to cultivate a taste for milder-salted butter than they have been accustomed to. The Commissioner says that larger supplies of Canadian butter of the right type would be welcomed on the old country markets.

The Canadian Record of Performance for Poultry was founded in 1919. The second year's record showed twenty per cent increase in the number of breeders who had given it their adherence, with an increase of birds entered of 69.5 per cent. Quebec showed the largest increase in breeders, and Ontario and British Columbia in birds.

The objects of the record are to develop and encourage the breeding of fowls that combine high production and standard qualities, and to secure for poultry breeders reliable information as to the sources of such stock. The keeping of records naturally leads to a knowledge of the best laying individuals, and to a recognition of individual parentage and ancestry or pedigree. Thus the establishment of the Record of Performance system is proving an immense step forward in the improvement of poultry breeding conditions.

So far British Columbia has made the best showing in percentage of birds qualified according to the number entered, Quebec coming second, Ontario third, New Brunswick fourth, and Saskatchewan fifth. Certificates are granted for birds laying 150 eggs in the fifty-two weeks and advanced certificates for birds laying 225 eggs. In 1919-1920, 17.2 per cent of the birds entered qualified, and in 1920-21 thirty per cent.

The estimated value of crops grown annually in greenhouses in Canada is upwards of three millions of dollars, and the area under glass is stated to cover about six million square feet of space.

Early in September a party of forty-three officials, county agents and farmers from the state of Ohio visited the European Corn Borer Laboratory at Port Stanley, Ont.

After visiting the laboratory, a trip was made in motor trucks to some of the more heavily infested fields. Stops were also made at the Dominion Government experimental control plots and at different fields where corn had been planted in accordance with suggestions made by the officers of the Entomological Branch. It was readily seen that late planted corn suffered less injury from the European corn borer than that planted earlier in the season.

The object of the trip, which was organized by the Ohio Department of Agriculture, was to bring to the attention of the farmers and county agents of that state the necessity of cooperative action in sections where the European corn borer is present and doing extensive damage.

The party was in charge of Mr. L. J. Taber, Director of Agriculture for Ohio, and included E. C. Cotton, Director of Plant Industry, Columbus; Prof. Raymond C. Osburn, Ohio University; Prof. Herbert Osburn, Ohio University; H. A. Gossard, State Entomologist; J. S. Houser, Assistant State Entomologist; T. H. Parks, Extension Entomologist, and N. E. Shaw, Columbus. Mr. W. A. Walton, Chief of the Division of Forage Insects, and Mr. W. L. Worthley, in charge of Corn Borer Control, of the United States Department of Agriculture, accompanied the visitors.

Mr. L. S. McLaine, Chief of the Division of Foreign Pests Suppression and Messrs. Crawford and Keenan of the Entomological Branch and Captain G. J. Spencer of the Ontario Department of Agriculture, conducted the party through the infested area.

The coliseum erected as the home of Canada's Royal Agricultural Winter Fair is said to be the finest building of the kind extant. It affords every facility for housing a big national show of the dimensions of the Royal.

A feature in connection with the Royal Agricultural Winter Fair will be a series of live stock judging competitions. There will be an inter-college competition for teams of five, and an inter-county competition for teams of five from any county in Canada.

The new dairy building at the Ontario Agricultural College, while not entirely completed, is sufficiently advanced for occupation. The building is a fine three-storied brick structure with well-appointed laboratories and lecture rooms. All the equipment is of the most modern and efficient type.

The Ontario Agricultural College opened this year with an attendance of approximately three hundred and sixty. The incoming year consists of ninety students. A new "intermediate year" has been inaugurated at the college, in which men who have completed the associate course can, by putting in an extra year's work, enter the regular degree course, for which matriculation standing is required. Ten men are taking advantage of this arrangement.

The Ontario Veterinary College, which has moved from Toronto to Guelph, is starting with an enrolment of 86 students.

In ten school fairs held in Essex County, Ontario, in 1922, 79 schools, 96 teachers and 3,000 pupils took part. Entries totalled 5,320 and 1,410 boys and girls gained prizes. The total attendance was 7,500.

The management committees for the fairs were composed of pupils, teachers and trustees supervised by the Agricultural Representative for the county. It has been found that local management contributes much to the success of the fairs.

Early last spring the Texas Gulf Sulphur Company offered to place at the disposal of the National Research Council \$10,000 for the purpose of establishing fellowships for the encouragement of researches relative to the use in agriculture of elemental sulphur, both inoculated and uninoculated. This offer was referred to the Advisory Council of the American Society of Agronomy and, after due consideration, it was agreed to accept this fund, the selection of the fellowships and the direction of the research being placed in the hands of a Special Sulphur Committee of the American Society of Agronomy, this Committee being jointly responsible with the Division of Biology and Agriculture of the National Research Council.

The Special Sulphur Committee appointed by the American Society of Agronomy is constituted as follows: Dr. A. G. McCall, University of Maryland, Chairman; Dr. R. W. Thatcher, Director Geneva Station, New York; Dr. H. L. Shanta, Bureau Plant Industry, U.S. Department of Agriculture.

This committee has agreed that the work to be prosecuted under these fellowships will include investigations concerning the value of sulphur and the control of potato scab, nematodes, soil insects, and sweet potato diseases. Also the value of sulphur as a fertilizer for alfalfa and other legumes, and the effect of sulphur on alkali soils.

These fellowships will be awarded to graduate students in the universities and colleges or to competent assistants in the experiment stations. In every case it is expected that the fellow shall devote practically his entire time to the investigation with such course work as may be necessary for him to meet the requirements for an advanced degree.

It is the expectation that the fellowships will receive \$1,000 a year and that the work planned will cover a period of three years.

Miss Catherine Graham, B.S.A., has been awarded a sulphur research fellowship by the National Research Council, Washington, D.C. It is understood that the award was made after a thorough study of her record as an undergraduate student, and after a personal interview with Miss Graham and also with Dr. J. H. Faull of the department of

THE AGRICULTURAL GAZETTE OF CANADA

botany, University of Toronto, under whom Miss Graham has been taking pathological work. Incidentally an investigation was made by the Special Sulphur Committee of the facilities offered by the pathological department of the University of Toronto. Miss Graham not only has an exceptional record as a student, but she gives promise of excellent work in the field of research.

She will continue her studies at the University under Dr. Faull's direction, devoting herself mainly to the investigation of sulphur in relation to potato scab and soil organisms.

The Director of Agricultural Extension of the University of Saskatchewan announces a series of short courses during January and part of February, 1923. Three courses of instruction will be given on internal combustion engines, including stationary and traction engines and automobiles; one course for creamery butter-makers, and one course in poultry husbandry.

Almost every department of the Government of Saskatchewan was represented at the fairs held at Regina and Saskatoon. One of the features was a moving picture tent where motion pictures were shown of the many different phases of public work. The films shown comprised the following: Egg marketing in Saskatchewan; tree planting; grading stallions; better bulls; selecting a dairy cow; cream grading; judging beef animals; "Saskatchewan's Fight," depicting the efforts being put forward at the Fort Qu'Appelle Sanatorium to fight the "great white plague;" boys' camps; "Nation Building in Saskatchewan," showing the work which is going on in the New Canadian settlements among the children; household science in Saskatchewan schools; "Through Life's Windows," showing the care and treatment of the eyes.

Community breeding of cattle has been undertaken in the districts of Turtleford and Aneroid, Saskatchewan. Both these districts have adopted the Ayrshire as the breed to be raised. For the Turtleford district eight carloads of high grade Ayrshire females have been purchased in the province of Quebec.

The famous Matador ranch, comprising 120,000 acres of federal grazing lands north of the Saskatchewan river, is being acquired by the Saskatchewan Government on leasehold terms for community grazing purposes.

Four of the Alberta schools of agriculture will conduct classes during 1922-23, namely those at Raymond, Claresholm, Olds, and Vermilion. A good attendance is looked for. At three of the schools special courses in irrigation will be given. The regular courses include practical and scientific agriculture for boys and home economics for girls. While both courses are complete in themselves, they also form the basis for advanced training at the University of Alberta.

The Alberta Provincial Live Stock Associations with headquarters at Edmonton, have decided to depart from the usual custom of holding an auction sale of sheep and swine this year. Instead, the Secretary, Mr. W. J. Stark, will list pure bred sheep and swine for sale at twenty-five cents per head. The listings will be classified according to breeds and mailed out to prospective purchasers who may deal direct with the breeders or through the Secretary. The stock listed for sale will be advertised in the agricultural press.

APPOINTMENTS AND STAFF CHANGES

Mr. Geo. E. McIntosh, Transportation Specialist, has been promoted to the position of Dominion Fruit Commissioner, succeeding Mr. C. W. Baxter, resigned. In his early life Mr. McIntosh was engaged in journalistic work in Lambton County, and took an active interest in the development of the fruit and vegetable industry. In 1911 at the request of the Ontario Fruit Growers' Association, Mr. McIntosh conducted an investigation into marketing conditions and transportation facilities for Ontario fruits, continuing work along this line on behalf of the Ontario Fruit Growers until 1917 when

he was appointed Transportation Specialist in the Federal Fruit Branch. In conducting this work he has been in personal contact with the fruit and vegetable growers, shippers and carriers from coast to coast, and has become thoroughly versed in the marketing problems of the various provinces.

Mr. J. Sydney Dash, B.S.A., a graduate of the School of Agriculture, Macdonald College, Que., formerly Director, Station Agromique, Pointe-a-Pitre, Guadeloupe, French West Indies, has been appointed Professor of Agriculture and Agronomy in the newly

created Tropical Agricultural College at Trinidad, B.W.I. For some months Mr. Dash filled the position of Supervising Seed Analyst to the Seed Branch of the Dominion Department of Agriculture from which position he resigned to take up his new duties.

In connection with the staff of the Ontario Agricultural College, a number of changes and additions are noted. Professor Sackville, for the past seven years connected with the animal husbandry department, is leaving to take charge of this department in the University of Alberta. His place here has been taken by Mr. J. C. Steckley, formerly agricultural representative for York county.

Mr. O. McConkey has been added to the field husbandry staff in the capacity of lecturer. He graduated from the College in 1917. Since then he has been taking post-graduate work in Alberta and Illinois.

Mr. G. E. Raithoy has also been taken on the staff of the animal husbandry department

as lecturer. He graduated from the College last year, and was a member of the stock-judging team at Chicago representing the College.

Professor R. Newton of the Department of Field Husbandry, University of Alberta, has recently returned from the University of Minnesota, where he has completed his graduate studies and residence requirements for the degree of Ph. D. He has been promoted to the rank of professor in the Department of Field Husbandry and will proceed to study problems in physiology in field crop plants.

Mr. J. P. Sackville, Associate Professor of the Ontario Agricultural College, has been appointed as head of the Animal Husbandry department, in the College of Agriculture, University of Alberta. Professor Sackville succeeds Mr. Dowell as head of this department.

THE LIBRARY

LIST OF PRINCIPAL ACCESSIONS TO THE DEPARTMENTAL LIBRARY, INTERNATIONAL INSTITUTE BRANCH, DEPARTMENT OF AGRICULTURE

Cyclopedia of hardy fruits, by U. P. Hedrick. New York, Macmillan co., 1922. 370 p. il., col. plates.

Guide to the dissection and study of the cranial nerves and blood vessels of the horse, by G. S. Hopkins. Ithaca, New York State veterinary college, 1922. 41 p. 9 plates.

Impurities of agricultural seed with a description of commonly occurring weed seeds and a guide to their identification, by S. T. Parkinson, B.Sc. and G. Smith, B.Sc. Ashford, Kent, Headley Bros. 1921. 105 p. il.

An indexed system of veterinary treatment; a work on modern medical surgical, and biological therapy, by William Scott, F.R.C.V.S. London, Baillière, Tindell & Cox, 1922. 696 p. 195 figs.

Wild flowers of Western Canada, by W. C. McCalla. Toronto, Musson book co. ltd. 1920. 132 p. il.

Agriculture and the community, by J. F. Duncan. Queensgate, Stirling, Scottish-farm servants' union, 1922. 119 p.

Feeding dairy cattle, by Prof. E. S. Savage. 4th edition. Syracuse, N.Y. Holstein-Friesian world, 1921. 118 p. il.

Trapping wild animals in Malay jungles, by Charles Mayer. New York, Duffield & co. 1921. 207 p. il.

Poor's and Moody's Manual of public utilities, 1922. 2480 p.

India on the march, by Alden H. Clark. New York, Missionary education movement, 1922. 179 p. il.

The building trades handbook. Scranton, Pa. International textbook co. 1921. 409 p.

Biology, by Charles Gramet, B.S. New York Globe book co. 1920. 115 p. (Globe outline series).

Twentieth century bird dog training and kennel management, by E. M. Shelley. Dayton, O. 1921. 98 p.

The practice of journalism, by Walter Williams and F. L. Martin. Columbia, Mo. Missouri book co. 1922. 328 p.

District school recitations, by Carleton B. Case. Chicago, Shrewsbury publishing co. 1917. 156 p.

The British bee-keeper's guide, by T. W. Cowan. London, British bee journal office, 1921. 226 p. il.

The British goat society's year book for 1922. London, 1922. 136 p. il.

Food friends we neglect, by C. H. Goudiss. New York, People's home journal, n.d. 87 p.

Wheat production in New Zealand, by D. B. Copland. Auckland, Whitcombe & Tombs, ltd. 311 p. diagrams. Bibl. pp. 308-9.

The northward course of Empire, by Vilhjalmur Stefansson. New York, Harcourt, Brace & co. 1922. 274 p. il.

The naturalisation of animals and plants in New Zealand, by Hon. Geo. M. Thomson. Cambridge, University press, 1922. 607 p. Bibl. pp. 569-584.

The direction of human evolution, by E. G. Conklin. New York, Charles Scribner's sons, 1922. 247 p.

The yeasts, by A. Guilliermond. New York, John Wiley & sons, 1920. 424 p. il.

Vital factors of foods, vitamins and nutrition, by Carleton Ellis and Annie L. McLeod. New York, D. Van Nostrand co. 1922. 391 p. il.

Vitamins and the choice of foods, by Violet G. Plimmer and R. H. A. Plimmer. Toronto, Longmans, Green & co. 1922. 164 p.

In Canada's wonderful northland, by W. T. Curran and H. A. Calkins. New York, G. P. Putnam's sons, 1920. 344 p. il.

Dictionary of husbandry, gardening, trade, commerce, and all sorts of country affairs, 2d, ed. London, W. Churchill, 1717. 450 p.

Poules qui pondent, poules qui paient, par A. J. Charon. Paris, Librairie agricole de la maison rustique, 1922. 236 p. il.

The federal service, by Lewis Mayers. New York, D. Appleton & co. 1922. 607 p.

Utilitarian economics, by F. W. Phelps and J. B. Myrick. Seattle, School of utilitarian economics, 1921. 261 p.

The microtometist's vade-mecum, by A. B. Lee. London, J. & A. Churchill, 1921. 594 p.

Basic slag and rock phosphates, by G. S. Robertson, D.Sc. Cambridge, University press, 1922. 120 p. il.

The microscope, by Lewis Wright, enlarged and rewritten by A. H. Drew. London, Religious tract society, 1922. 287 p. il.

The teaching of general science, by E. L. Eikenberry. Chicago, University press, 1922. 169 p.

Agricultural research and the farmer, by V. E. Wilkins. London, H. M. Stationery office, 1922. 168 p.

An introduction to the analytical chemistry of the rarer elements, by L. J. Curtman. New York, published by the author, 1922. 64 p.

Farm light and power year book. New York, Farm light and power publishing co. 1922. 338 p. il.

Electroculture, by A. C. Bennett. Sydney, N. S. W. Angus & Robertson, ltd. 1921. 118 p. il.

Sweet peas, by H. J. Wright. London, J. C. & E. C. Jack. 116 p. il.

Les stimulants radio-actifs en agriculture, par Lucien Fournier. Paris, Librairie de l'Institut national agronomique, 1922. 73 p.

Propagation of the dahlia, by C. B. Bolles. Media, Pa. 1922. 56 p. il.

Response in the living and non-living, by Sir Jagadis C. Bose. Toronto, Longmans, Green & co. 1922. 199 p. il.

Studies of plant life in Canada, by Mrs. C. Parr Traill. Toronto, William Briggs, 1906. 227 p. il.

Intensive strawberry culture, by Louis Graton. Whitman, Mass. 1922. 91 p. il.

Producing in little theatres, by Clarence Stratton. New York, Henry Holt & co. 1921. 258 p. il.

Principles of national economy, by T. N. Carver. New York, Ginn & co. 1921. 773 p.

Under the roof of the jungle, by C. L. Bull. Boston, The Page co. 1922. 271 p. il.

Pocket companion for engineers, architects and builders. Pittsburgh, Carnegie steel co. 1921. 414 p.

DeRæf loose leaf manual on milk products. Kansas City, Mo. N. A. Kennedy supply co. 1921. 140 p.

La connaissance du lait, par Marc Fouassier. Paris, J. B. Baillièrre et fils, 1922. 136 p. il.

American poultry doctor, by N. W. Sanborn. Syracuse, N.Y. C. C. DePuy, 1913. 64 p.

Report on the poultry industry in the Netherlands, by Edward Brown. London, John Bale, sons and Danielsson, ltd. 1921. 136 p. il.

High egg production by individual hens, pens and flocks, by H. W. Jackson and G. M. Curtis. Quincy, Ill. Reliable poultry journal publishing co. 1922. 176 p. il.

United Ancona club year book, 1922. Franklinville, N.Y. 1922. 56 p.

The care of dogs, by A. F. Hochwalt. Cincinnati, Sportsmen's digest, 1922. 25 p. il.

Silver fox fur farming and its opportunities. Utica Central New York fur co. 12 p.

Principles of farm practice, by B. M. Davis. New York, D. C. Heath & co. 1922. 350 p. il.

Community drama. New York, Community service, inc. 1921. 156 p. Bibl. pp. 122-155.

Community buildings for industrial towns. New York, Community service, inc. 1921. 94 p. il.

The agricultural index, 1919-1921. New York, H. W. Wilson, co. 1922. 1226 p.

How to teach agriculture, by A. V. Storm, and K. C. Davis. Montreal, J. B. Lippincott co. 1921. 434 p. il.

Farm projects, by Carl Colvin and J. A. Stevenson. Toronto, Macmillan co. of Canada, 1922. 363 p. il.

Practical farm accounting system. Coshoc-ton, O. American art works, 1918. 48 p.

Economic developments in Denmark before and during the world war, by Harald Westergaard. Oxford, Clarendon press, 1922. 106 p. (Carnegie endowment for international peace).

Early days on the Yukon, by William Ogilvie. Ottawa, Thorburn and Abbott, 1913. 306 p. il.

Esquisse d'une histoire du régime agraire en Europe aux XVIIIe et XIXe siècles, par Henri See. Paris, Marcel Giard et cie, 1921. 276 p.

Jahrbuch fur wissenschaft und praktische tierzucht, Vol. 14, 1921. Hannover, Schaper, 1921. 368 p.

Schomllers jahrbuch fur gesetzesgebung, verwaltung und volkswirtschaft im deutschen reiche, Vol. 46, 1922. Munchen, 1922. 316 p.

House decorations and repairs, by William Prebble. Toronto, Sir Isaac Pitman & sons, ltd. 1922. 114 p. il.

Designs for a three teacher rural school with teachers' cottage, New York, White pine bureau, 1921. 24 p. il.

Elementary electric wiring, by B. B. Burling and A. M. Karweik. Milwaukee, Wis. Bruce publishing co. 1921. 56 p.

Practical wireless telegraphy, by E. E. Bucher. New York, Wireless press, inc. 1921. 336 p. il.

The economic basis of politics, by C. A. Beard. New York, A. A. Knopf, 1922. 99 p.

Trail craft, by C. P. Fordyce. Cincinnati, Stewart, Kidd co. 1921. 202 p. il.

Standard wiring for electric light and power by H. C. Cushing, Jr. New York, published by the author, 1921. 399 p. il.

Experimental wireless stations, by P. E. Edelman. New York, N. W. Henley publishing co. 1922. 392 p. il.

Radio-telephony for everybody, by L. M. Cockaday. New York, F. A. Stokes co. 1922. 213 p. il.

The elements of refrigeration, by A. M. Greene. New York, John Wiley & sons, 1919. 472 p. il.

Boys' home book of science and construction by A. P. Morgan. Boston, Lothrop, Lee & Shepard co. 1921. 458 p. il.

Ropp's farmers' reckoner. Chicago, C. Ropp & sons. 128 p.

Elementary home economics, by M. L. Matthews. Boston, Little, Brown & co. 1922. 343 p. il.

A manual of hygiene and sanitation, by S. Egbert. New York, Lee & Febiger, 1919. 554 p. il.

Graded outlines in hygiene, by W. F. Cobb. Yonkers-on-Hudson, World book co. 1922. 214 p.

The newer knowledge of nutrition, by E. V. McCollum. Toronto, Macmillan co. of Canada, 1922. Revised edition. 449 p. il.

Health education and the nutrition class, by J. L. Hunt, B. J. Johnson and E. M. Lincoln. New York Bureau of educational experiments, 1921. 279 p. il.

Social problems, by Anna Stewart. New York Allyn & Bacon, 1917. 233 p.

Society and its problems, by G. S. Dow. New York, T. Y. Crowell co. 1920. 594 p.

Taxation, by C. B. Fillebrown. Chicago, A. C. McClurg & co. 1914. 163 p.

Civic science in the community, by G. W. Hunter and W. G. Whitman. New York, American book co. 1922. 430 p. il.

The community, by E. C. Lindeman. New York, Association press, 1921. 222 p.

New churches for old, by J. H. Holmes. New York, Dodd, Mead & co. 1922. 341 p.

The fiscal and diplomatic freedom of the British oversea dominions, by Edward Porritt. Oxford, Clarendon press, 1922. 492 p. (Carnegie endowment for international peace).

Timber, by Harold Titus. Boston, Small, Maynard & co. 1922. 379 p.

NEW PUBLICATIONS

DOMINION DEPARTMENT OF AGRICULTURE

Division of Botany.—Interim Report of the Dominion Botanist, H. T. Gussow, for the year ending March 31, 1922. Dominion Experimental Farms.

Tobacco Division.—Interim Report of the Officer in Charge, F. Charlan, for the Year 1921. Dominion Experimental Farms.

New Varieties and Selections of Grain Originated on the Dominion Experimental Farms.—By Chas. E. Saunders, B.A., Ph.D., LL.D., F.R.S.C., Dominion Cerealists. Bulletin No. 11.—New Series.

The Canadian Record of Performance for Pure-Bred Dairy Cattle.—Report No. 14. Regulations, Standards and Records of Cows Qualified for Registration. Live Stock Branch.

Why and How to Use Skim-Milk.—Circular No. 5. By Helen G. Campbell, Dairy and Cold Storage Branch.

Why and How to Use Cream.—Circular No. 6. By Helen G. Campbell, Dairy and Cold Storage Branch.

Why and How to Use Cottage Cheese.—Circular No. 7. By Helen G. Campbell, Dairy and Cold Storage Branch.

Why and How to Use Buttermilk.—Circular No. 8. By Helen G. Campbell, Dairy and Cold Storage Branch.

The Branding or Marking of Cheese and Butter Boxes.—Circular No. 9. Dairy and Cold Storage Branch.

Dehorn Your Commercial Cattle.—By P. E. Light, B.S.A., Dominion Live Stock Branch, and G. B. Rothwell, B.S.A., Dominion Animal Husbandman. Pamphlet No. 15—New Series.

The Root Vegetables Act, 1922.—Acts, Orders and Regulations No. 3. The Fruit Branch.

ONTARIO

Women's Institutes.—Report of 1920 and 1921.

Horticultural Societies, 1921.—Sixteenth Annual Report.

Debates, Plays and Community Music for Rural Social Organizations.—By O. J. Stevenson, M.A., D.Paed., Professor of English, Ontario Agricultural College. Special Bulletin.

Sweet Clover.—Circular No. 41. By W. J. Bell, B.S.A., Principal, and E. K. Hampson, B.S.A., Field Husbandry Department, Kemptville Agricultural School.

Mixed Farming in the Ontario Corn Belt and Mixed Farming and Apple Orcharding in Ontario.—Bulletin No. 288. Farm Management Series, Part 5. Ontario Agricultural College.

QUEBEC

Lime and Pulverized Limestone.—Their Employment as Soil Correctives in the Province of Quebec.—By Professor H. M. Nagant, I.A.I.F., Oka Agricultural Institute. Bulletin No. 76.

Quebec Society for the Protection of Plants, 1921-22.—Fourteenth Annual Report.

MANITOBA

Department of Agriculture and Immigration.—Annual Report for the Fiscal Year ending November 30, 1921.

Manitoba Flora.—Check List with Notes. Botany Department, Manitoba Agricultural College, 1922.

SASKATCHEWAN

Twelfth Annual Report of the Director of Agricultural Extension.—On the work of the Agricultural Societies of Saskatchewan during the twelve months ended April 30, 1922.

Co-operation and Markets.—Eighth Annual Report of the Commissioner for the twelve months ended April 30, 1922.

BRITISH COLUMBIA

Sixteenth Annual Report of the Department of Agriculture, 1921.

Yields, Grades, Prices and Returns for Apple Varieties in the Okanagan Valley.—By W. A. Middleton, B.S.A., Extension Assistant, College of Agriculture. Agricultural Department Bulletin No. 90.

Small Fruit Survey.—A Report on the Cost of Growing Strawberries and Red Raspberries in Certain Coast Sections of British Columbia during the season of 1921. By A. F. Barss, A.B., B.S. in Agr., M.S., College of Agriculture. Agricultural Department Circular No. 39.

Dairy Farm Survey.—Report on One Hundred and Twenty-four Farms in the Arrow Lakes, Chilliwack, Courtenay, Ladner and Salmon Arm Districts. By H. R. Hare,

THE AGRICULTURAL GAZETTE OF CANADA

B.S.A., Extension Assistant, College of Agriculture. Agricultural Department Bulletin No. 91.

Peat and Muck Soils.—By Wm. Newton, Chief Soil and Crop Instructor. Agricultural Department Circular No. 39.

Varieties of Fruit Recommended for Planting in British Columbia.—Circular No. 64 (New Horticultural Series).

British Columbia Fruit-Growers' Association.—Thirty-second Annual Report for the year ending December 31, 1921.

MISCELLANEOUS

The Province of Saskatchewan—Its Development and Opportunities.—By F. H. Kitto,

D.L.S., A.M.E.I.C. Prepared under the direction of the Superintendent, Natural Resources Intelligence Branch, Department of the Interior.

The Hereford Herd Book.—Volume 13 of the Canadian Hereford Herd Book contains the pedigrees of cows and bulls numbered 41,228 to 44,334.

The Aberdeen-Angus Herd Book.—The Canadian Aberdeen-Angus Herd Book, Volume 6, contains the pedigrees of bulls and cows numbered 22,870 to 29,699.

Live Stock and Animal Products Statistics, 1921.—Issued by the Internal Trade Branch, Dominion Bureau of Statistics. Prepared in collaboration with the Department of Agriculture, Canada.

PART V

The International Institute of Agriculture

FOREIGN AGRICULTURAL INTELLIGENCE

All communications in regard to this section should be addressed to T. K. Doherty, International Institute Commissioner, Department of Agriculture, West Block, Ottawa.

SCIENCE AND PRACTICE OF AGRICULTURE

CROPS AND CULTIVATION

1093.—The Effects of Liming on the Availability of Soil Potassium, Phosphorous and Sulphur.—PLUMMER, J. K., in *Journal of the American Society of Agronomy*, Vol. 13, No. 4, pp. 162-171, bibliography of 21 publications. Lancaster, Pa., Apr. 1921.

A discussion dealing with the important question of the effects of liming on the availability of soil potassium, phosphate, and sulphur.

The more recent research, embodying laboratory extractions with weak solvents, pot studies using a variety of plants as indicators of the concentration of the soil solution in potassium and the analyses of their ash, lysimeter experiments by which the production of potassium has been measured, and field tests, has failed to show that basic compounds of calcium and magnesium increase, by chemical action, to any practical extent, the availability of the soil store of native potassium.

More research needs to be carried out before we can say that additions of lime will reduce the necessity of applying soluble phosphates to the soil. As measured by yields, phosphates of iron and aluminum seem to be as available as calcium phosphates. It is very probably true that fixation of phosphatic fertilizers by colloidal absorption induced by iron and aluminium oxides is responsible for the failure of some crops to respond to phosphorous additions. Additions of lime to such soils undoubtedly flocculate some of these colloids, thus giving the soils a better physical condition for plant growth. Additions of lime before and after applications of soluble phosphates, have greatly increased the efficiency of the phosphatic fertilizer. When insoluble calcium phosphate has been applied, it seems that applications of lime have reduced the effectiveness of the phosphate in the majority of cases.

The scant data of lysimeter experiments only, which deal with the question of sulphate

availability or conservation, seem to show that liming with small amounts of lime, both small and large amounts of magnesia, magnesium carbonate, limestone, dolomite, and magnesite, increases the solubility of native soil sulphate. Heavy applications of lime for a few years at least, apparently reduce this loss of sulphur from the soil.

Influence of Fallow vs. Stable Manure.—

PFEIFFER, T., in *Landwirtschaftliche Versuchsstationen*, Vol. 98, No. 3-4, pp. 187-222. Berlin, 1921.

It is concluded that a well-established action of fallow tending to increase crop yields is exceptional, and occurs only under special and unusual conditions. The results obtained could not more markedly indicate the insignificance of fallowing in connection with favourable influences on the nitrogen content of soil, and showed the probability of losses of available nitrogen during fallowing by leaching.

The results of the studies with stable manure emphasized the importance of the residual action of manure in soil, which it is concluded is much better in many cases than average results would indicate. These results are also taken to indicate that stable manure is the best material for maintaining the so-called original strength of the soil.

Studies of the nitrogen balance of the soil as influenced by the factors tested showed that the decrease in the total nitrogen content of the soil was greater under the legume rotation than under the fallow rotation, but that the increase in the nitrogen content of the total crop from each rotation was the same. This is taken to indicate the greater value of the nodule bacteria of legumes than of the free living nitrogen-fixing bacteria of fallow for nitrogen fixation. The rotation including stable manure treatment had the most favourable influence on the nitrogen balance of the soil, this being attributed to the residual action of the manure.

The Fertilizing Action of Carbon Dioxide.—GEHRING, A., in *Fühling's Landwirtschaftliche Zeitung*, Vol. 70, Nos. 7 and 8, pp. 137-153; 9-10 pp. 181-197. Stuttgart, 1921.

The author brings together the results of a number of studies on the production of carbon dioxide in soils by organic fertilizers, such as guanol, and its influence upon crop growth.

It is first shown that guanol exhibits a degree of decomposition of its organic constituents corresponding to that of the most mature peat. The peat used in the manufacture of guanol is not only a fertilizer carrier but exercises an important fertilizing action. It was found in laboratory experiments that both guanol and stable manure in normal applications increase the carbon dioxide production in the soil. When plants were grown under glass on soil so treated they showed a more intense green colour than untreated plants, and were more resistant to external injurious influences.

It is concluded that carbon dioxide fertilization in the form of humus additions to soil is a practical possibility of considerable importance, and that guanol, on account of its content of decomposed peat in addition to its mineral nutrient content, is an actual fertilizer of this nature. It was also found that carbon dioxide fertilization of grain crops with guanol increased the ratio of grain to straw. Further studies showed that liming caused an unmistakable action of carbon dioxide, both in soils which are unfertilized and in soils which have been fertilized with organic matter.

Science and Crop Production.—RUSSELL, E. J., in *Nature*, Vol. 108, No. 2708, pp. 116-120. London, 1921.

This is an abstract of a farmers' lecture of the British Association delivered at Edinburgh, in which a review is given of studies conducted at the Rothamsted Experimental Station on the use of manure and fertilizers in relation to crop production. The summarized results of long-time experiments are taken to indicate that it is only a first approximation to say that artificial fertilizers are equally as good as barnyard manure. It is pointed out that barnyard manure produces effects of the highest importance to the land which no known combination of artificial fertilizers will bring about.

It is shown that barnyard manure differs in two ways from artificial manures. The variation in yield from year to year is diminished by the use of barnyard manure, as is also the deterioration in fertility due to continuous cropping for a period as long as 80 years. On the other hand, tests with at least 15 different combinations of artificial fertilizers have shown that the results fluctuate considerably from season to season

and deteriorate as the years pass by. Barnyard manure never did badly even in the worst seasons, but it did not yield record crops even in the best seasons.

The deterioration in yield from plots treated with artificial fertilizers has been marked, especially on the wheat and barley plots, and has been greatest where one of the essential fertilizer constituents was withheld. General means of improving crop production are discussed.

Investigations on the Hardening Process in Vegetable Plants.—ROSA, J. T., in *Missouri Agricultural Experiment Station, Research Bulletin* 48, pp. 5-90. Columbia, 1921.

This study was undertaken as one of the phases of a project on the transplanting of vegetable plants, and since the hardening process resulted in a condition of acquired hardness, the experiments are believed to throw considerable light on the general problem of cold resistance in plants. Cabbage was used as a representative type of plant which is capable of being hardened so as to withstand considerable ice formation within the leaves, and the tomato was used as the representative of a type of plant which can not be so hardened as to withstand ice formation. Lettuce, cauliflower, kale, celery, peppers, eggplants, and sweet potatoes were other plants investigated.

The data show that the hardening process in plants is accompanied by a marked increase in water-retaining power, and that this water-retaining power is due chiefly to the imbibitional forces of the cell. The amount of water frozen in hardy plants is less than in tender plants, and cells of hardy plants were found to retain a larger amount of unfrozen water than those of tender plants. It is believed that cold resistance in plants is due to the increased water-retaining power of the cells, and the increased water-retaining power is associated with increased moisture content, increased amount of hydrophilous colloids, such as pentosans, increased water-retaining power of such cell colloids, and increased amount of osmotically active substances as soluble sugars. The marked parallelism between pentosan content and hardness is believed to indicate a causal relationship, although the pentosan content alone can not be taken as an absolute index of cold resistance. Salt content, acidity, hydrogen-ion concentration, sugar, moisture, protoplasmic colloids other than pentosans, etc., may influence water-retaining power and hardness.

It is believed that the fundamental difference between hardy and tender species lies in their ability to initiate changes whereby the stability, and water-retaining power of the protoplasm and consequently hardness are increased. Hardy species and varieties

are said to possess the ability to initiate such changes to a greater or less great degree, while tender species possess it to a very slight degree or not at all.

In view of the connection between cell water-retaining power and hardness which has been found and the correlation between soluble pentosan content and hardness, it appears that selection of plants for high soluble pentosan content may be helpful to the breeder of cold-resistant, drought-resistant, or disease-resistant varieties of crop plants.

1101.—The Intensity of the Green Colour as a New Factor to be Taken Into Account in Wheat Selection.—WESTERMEIER, KURT, in the *Zeitschrift für Pflanzenzüchtung*, Vol. VIII, Part I, pp. 14-25. Berlin, March, 1921.

Chlorophyll is a fundamental factor in all the physiological processes leading to increase of substance, and since the chief aim of all breeding work connected with agriculture is to increase the yield, the study of chlorophyll from the genetic standpoint is of paramount importance.

The author's experiments were carried out on the following varieties and kinds of wheat:—

WINTER WHEAT.—*Triticum vulgare*:—Naussauer Milchweizen, Kladener Altmarkischer Braunweizen, Crievenner 104. Siebenburger gefleckt, Strubes Squarehead.

Triticum turgidum: Wohltmanns Schwarzer Bartweizen, Wohltmanns Weisser Bartweizen, Kirsches fruher Grannenweizen.

Triticum capitatum: Cimbals Geheimrat Wohltmann.

SPRING WHEATS.—*Triticum monococcum vulgare*, *T. dicoccum sericeum album*, *T. Spella Arduini*, *Triticum polonicum*, *R. durum*. (Durum wheat and Portuguese Lebeiro), *T. vulgare* (Bielokoloska, Svalofs Perl; Rapado de espica blanca, Rimpaus Roter Schlanstedter, etc.). *Triticum compactum* (Mocho de espica quadrata, Igel and Binked). *T. turgidum* (Ontario, Utah, Branco).

The author studies the connection between the different metabolic processes and the development of chlorophyll as shown by a scale of colours based on two fundamental colour schemes: 96 green mottled with yellow, and 92 (decided green).

The following results have been obtained:—

A. Effect on the Plant of Chlorophyll Development.

I.—The plants of the *vulgare* form, colour 96;

(a) In the first stages, grow more slowly the deeper the colour.

(b) The reverse occurs at the time of heading, the darker plants developing more rapidly.

(c) The dark types head earlier than the light.

(d) The total growth period of the dark types is longer than that of the light.

II.—The plants of the *vulgare* form colour 92, have, as has been said, a shorter growth period, they develop slowly until the heading stage, but from that time, the process is accelerated (until the stage when growth ceases), as if the chromatic type 92 was able to turn the solar energy to better account.

III.—The same occurs both with the *compactum* and *vulgare* forms.

IV.—The dark *turgidum* forms first grow quicker than the light forms, and it is only at the flowering season that they are out-distanced by the latter, which have altogether a longer growth period (thus differing from *vulgare*).

V.—The light types flower later.

VI.—The darker the colour, the less is the foliage in proportion to the length of the culm. There is thus, economy of leaf-surface.

VII.—The development and tone of the leaves influence the culm length, which increases with the intensity of the colour. The same applies to the thickness of the culms.

B. Effect of Chlorophyll on the Grain: I.—The weight of kernels per ear, the content of nitrogenous substances, of dry matter and ash increase as the green of the vegetative parts becomes deeper.

II.—With greater intensity of colour, the proportion of nitrogenous substances to dry matter increases with growing rapidly, though the dry matter content itself tends to rise.

III.—The proportion of nitrogen free substances to gluten decreases with the intensity of the colour.

IV.—The same colour shade may have different effects upon different varieties of wheat.

Rust Resistance in Winter Wheat Varieties.

—MELCHERS, L. E., and PARKER, J. H., in *United States Department of Agriculture, Bulletin* 1046, pp. 32. Washington, D.C., 1922.

Field experiments to determine the resistance to black stem rust (*Puccinia graminis tritici*) of about 100 varieties and strains of winter wheat, many of them pure-line selections, and of a few varieties of spring wheat, were conducted in a rust nursery at Manhattan, Kansas, in 1915, 1916, and 1917. Greenhouse experiments were conducted during the winter of 1916-17, using the same varieties. Special methods were developed for producing rust epidemics under the prevailing climatic conditions of Kansas.

In the rust nursery severe epidemics were produced each season, and the percentage of rust infection probably represented the maximum rust attack which the varieties would encounter under field conditions.

All the winter-wheat varieties grown were found to be susceptible to stem rust except Kanred and two very similar pure-line selections, P1066 and P1068. These three varieties were found to be resistant. Another pure-line strain, Kansas No. 2390, gave evidence of being partially resistant.

Plumpness of kernels usually is reduced by severe rust attack. The three resistant varieties produced grain of good quality in 1916 and 1917, when other varieties grown under the same conditions but much more severely rusted produced very badly shrunken kernels.

Several varieties of spring wheat proved rust resistant under the conditions of these experiments, though the Black Persian was the only spring-wheat variety of the common or bread-wheat group (*Triticum vulgare*) which was found to be resistant. Of the varieties of durum or macaroni wheat (*Triticum durum*), Beloturka (C. I. No. 1513), Iumillo (C.I. No. 1736), Kubanka (C.I. No. 2094), Monad (D-1), and Pentad (D-5) showed definite signs of resistance to stem rust. A hybrid of Iumillo x Preston, resembling the durum parent, also was found to be rust resistant. All of the strains of emmer and einkorn grown gave some evidence of resistance.

In the greenhouse experiments the plants were studied for rust resistance at two stages of growth, viz., as seedlings and at the time of heading. The results were very similar to those in the field experiments. All the winter-wheat varieties were susceptible except three—Kanred, P1066, and P1068. Kansas No. 2390, which appeared to be somewhat resistant in the field, showed no evidence of resistance at either stage of growth in the greenhouse. Most of the spring-wheat varieties which the field experiments had shown to be resistant also gave more or less evidence of resistance under greenhouse conditions. This was not true, however, of einkorn.

Although the results obtained in the field and those in the greenhouse agree fairly well, final conclusions as to rust resistance of a variety should not be drawn from greenhouse tests alone. The combined evidence from nursery experiments and inoculations of seedlings and of plants in the heading stage under greenhouse conditions is much more likely to agree with actual field trials, which must always be the final test of the practical value of any variety.

The behaviour of the rust parasite on the inoculated plants of the three resistant varieties—Kanred, P1066, and P1068—seems to be different from that in other varieties described as resistant. In most

other varieties prominent flecks are nearly always present in 8 to 12 days after inoculation, and most frequently small uredinia are produced. In these three varieties, however, flecks are very rarely visible, and in no instance have even the most minute uredinia been observed.

Reports from Alabama, California, Illinois, Iowa, Missouri, Nebraska, New York, Wisconsin, and New South Wales indicate that these three varieties are resistant to stem rust; but Minnesota and South Dakota report them rather severely attacked by stem rust. The occurrence of distinct strains of stem rust complicates the problem of predicting what their behaviour may be during different seasons. Present knowledge of the distribution of stem-rust strains and whether they occur each season in definite regions is so limited that the resistance or susceptibility of these wheats in any region may differ from season to season.

The very light infection of leaf rust in sowings made in Alabama, Arkansas, California, Missouri, North Carolina, North Dakota, Oregon, South Dakota, Tennessee, Texas, Virginia, and Wisconsin, and in New South Wales has proved that these three varieties are extremely resistant to leaf rust also. Present knowledge of the leaf-rust problem indicates rather definitely that these varieties will maintain this high degree of resistance under a wide range of conditions.

Kanred, one of the three rust-resistant pure lines, has an unusual combination of desirable characters. In Kansas it yields from 3 to 5 bushels more per acre than either Turkey or Kharkof, the varieties commonly grown. It ripens a little earlier, thus escaping some of the damage from drought and hot winds during the ripening period. Kanred also seems to be more winter hardy in Kansas than other varieties and survives the severe winters with less loss from winter killing. In milling and baking quality it apparently is equal to Turkey and Kharkof, varieties of hard red winter wheat which have established a world-wide reputation for quality.

Experiments and the experience of large numbers of farmers have shown that Kanred is adapted to other sections of the hard winter-wheat area, and it is now rapidly being introduced and widely grown in Oklahoma, Texas, Nebraska, eastern Colorado, and some other States.

Kanred wheat is believed to have considerable potential value also as a parental variety to be used by plant breeders in combining its rust resistance and other valuable characters with those of the varieties of other classes of wheat adapted to the several wheat-growing districts.

1110.—Comparison Studies of the Resistance to Lodging of Several Pure Bred Wheat Varieties.—DRAGHETTI, A., in *Le Stazioni*

Sperimentali agrarie italiane, Vol. LIV, Pts. 4-6, pp. 145-180. Bibliography of 21 works. Modena, 1921.

For general purposes it is possible to distinguish at least three characteristic forms of lodging, to be attributed: (1) to excess of nitrogen; (2) to weather conditions; (3) to a lack of uniformity of the stem.

Practical experience has led to the classification of the varieties most liable to lodging, even under normal conditions; it is therefore possible to make a distinct classification of wheat varieties. This may be attributed to the fact that different types present marked and constant differences as regards the equilibrium of the stem. For this reason it is possible to make investigations with a view to the discovery of the weak side of their morphological structure.

The author was not content to rely on empirical observations for the investigations described in minute detail in the present article, but rather on the statistical biometric method by which means he aimed at the solution of the following problems.

(1) To find a positive or negative value attributable to different varieties, under fixed biological cultural conditions in order to facilitate the establishment of a rational gradation with respect to lodging;

(2) To find and evaluate the positive and negative characters which should serve as a guide in selection work;

(3) To trace the outline, from the statistical standpoint of a typical plant free from the inferior qualities associated with the breed.

A selection of varieties of cultivated wheats was made with a view to conducting comparative adaptation trials at the Experiment Farm at the Forlì Agricultural Station, on clay loam, following on beets; the ordinary fertilizers and cultural operations being in every case employed.

For each stem the author determined (from May 10 to 20): (1) weight; (2) height to top of ear; (3) height from centre of gravity, taking into account the influence exercised by the varying lengths and thickness of the upper leaves; (4) length, weight, diameter and thickness of the epidermis of each internode; (5) weight, in grammes, determining the break due to bending of the lower portion of each internode and for a bract of 10 cm.; (6) submission to bend up to limit of breakage in cm., and angle of inflexion in degrees. For determinations (5) and (6), the author has invented an apparatus which is described and illustrated.

The biometrical data obtained serve as a basis to estimate the mean and to deduct the coefficients of variability by applying the Gauss formula.

In this way a marked positive correlation has been established between the unit

weight of the internode and its resistance to bending.

The data obtained concerning the average degree of bending of 10 varieties studied, permit the conclusion that a characteristic elasticity exists for each and this factor is a point of considerable importance. As a matter of fact, their progressive value is in perfect correlation with the gravity of lodging observed in the plots concerned, for example:

Inflexion, First Internode	Cultural Observations
4.8 a 5.9 cm.....	Stems completely resistant.
7.3 a 8.0 ".....	" partly liable to lodging.
8.8 a 9.0 ".....	" completely beaten down.

Flexibility of stems is therefore a character which should be taken into consideration as much from the practical (comparatively thick sowing) as from the experimental point of view.

Formulae have here been established, criticized and developed, relative to the calculation of moments of inactivity, of resistance and of unit coefficients of breakage; this is followed by observations with reference to the intrinsic of local mechanical factors: (a) pressure due to the force of the wind; (b) pressure due to the displacement of the centre of gravity from the vertical; (c) pressure due to adhesive raindrops. Determinations are made as to the statistical equilibrium and the balance between positive and negative pressure of the stem and an examination of the differential mechanical characteristics attached to the varieties studied.

Taking the "index of resistance of lodging" to indicate the relationship between the pressure of resistance and the pressure of flexion for each variety, in such manner that the equilibrium be represented by unity, the positive resistance by a number superior to 2 and the negative resistance by a value inferior to unity, the following values will be obtained: Rieti fam. 11: 1.026—Gentil rosso fam. 48: 1.002—Cologna fam. 12: 0.881—Inalleteabile fam. 38: 1.232—Caro: sello fam. 91: 1.052—Marsolino fam. 33-0.981—Coronation: 1.309—Apulia: 0.818—Luigia Strampelli: 0.950—Dauno: 0.877.

Supposing that the more forcible pressures of total resistance or total deflection be taken as equal to 100, the author calculates that this may be sub-divided into 3 part time pressures due to wind, to displacement of centre of gravity and adhering raindrops. The results are shown in tabular form, and permit the following conclusions:—

(1) That the force which is the chief cause of distorted development even for

varieties with a very flexible stem, is in all cases the wind, which possesses an influence coefficient varying from 64.3 to 83.7% for total deflection.

(2) That the sum of the coefficients of wind effect and displacement of centre of gravity is very nearly constant; i.e., the coefficient of wind effect is inversely proportional to stem flexibility, whilst the coefficient of effect of deviation from the centre of gravity is directly proportional to it.

But these relations have only an approximate value; the only one having any absolute and specific value is that arising from the results of comparison of the index numbers concerning moments of resistance and total deflection.

The statistical ratio of the stem is given in the article. The results obtained recently are very encouraging as to the possibilities of arriving at the solution of the problem of lodging and increase in yield.

Seed Production in Red Clover.—SCHLECHT, F., in *Zeitschrift für Pflanzenzüchtung*, Vol. 8, No. 2, pp. 121-157. Berlin, 1921.

The investigations reported concerned self and close-pollination of red clover, the activities of bumblebees and honey-bees as red clover pollinators, and observations on other factors involved in seed production in this crop.

Spontaneous self-fertilization of red clover is not considered possible. Artificial self-pollination or the use of pollen from flowers on the same head was fruitless, and inter-pollinating plants propagated vegetatively by root division did not generally give more seed than pollinating within the same plant. Pollen tubes ranged from 5.2 to 11 mm. in length, averaging 8.71 mm. with the largest heads generally containing the longest tubes. The tubes in the second cutting were somewhat longer than in the first, probably due in part to climatic conditions and soil fertility. A retrogression was noted in the third cutting.

Fertilization by honeybees under gauze enclosures was about 4.5 per cent greater than occurred in plants in the open. Honeybees appeared to be better pollinators than bumblebees in large gauze cages, as they did not break out and the pollen was practically pure. Single bees in small cages failed to pollinate.

Contrary to observations of Martin, high atmospheric humidity showed only a slight influence on seed production. Both seed cells in the ovary were found able to mature seed, but pods with one seed were far more prevalent. Seed from double pods were smaller as a rule, and about one-fifth lighter in weight than those from single pods. While double seed pods contained more shrivelled seed, striking differences in germinability, were not observed.

A plant disease, *Botrytis antherarum trifolii*, which completely destroys the anthers of red clover, is described.

Methods of Winter Wheat Production.—

COLE, J. S., and HALLSTED, A. L., in *United States Department of Agriculture Bulletin* 1094, pp. 31. Washington, D.C., 1922.

The Fort Hays branch station is located in Ellis County, Kansas. This county is in the western tier of the solid block of "million-bushel" wheat counties in that State. Statistics of the Kansas State Board of Agriculture show that the agriculture of this section has been stabilized for 30 years by devoting nearly three-fourths of the cultivated acreage to winter wheat. The statistics also show that during this period there has been no change in yields. The average yield of Ellis County for the 30 years from 1891 to 1920, inclusive, is only 9.6 bushels per acre.

The statistics of crop acreage show that if every acre in other crops were seeded to wheat it would still be necessary to sow approximately two-thirds of the wheat following wheat. About one-half of the other third, or one-sixth of the total wheat acreage, might be sown following corn, and the other sixth following miscellaneous crops, chiefly grain and forage sorghums. The greatest cultural problem in terms of acres involved, consequently, is how to prepare wheat stubble for wheat.

Results of experiments in methods of wheat production conducted co-operatively at the Fort Hays branch station are available for the 14-year period from 1907 to 1920, inclusive.

During this entire period wheat has been grown continuously after wheat by several methods of cultivation. There are 90 days between harvest and seeding. Late ploughing, 73 days after harvest and 17 days before seeding, has averaged 10.5 bushels per acre. This is the lowest yielding method under trial, but is practically the same as the Ellis County average of 10.2 bushels for the same period. Early ploughing, 32 days after harvest and 58 days before seeding, has averaged 14.6 bushels per acre. Early ploughing subsoiled has averaged 17 bushels, and land listed instead of early ploughed has averaged 17.3 bushels. Land alternately fallowed and cropped to wheat has averaged 20.3 bushels.

During the 7-year period from 1914 to 1920, inclusive, surprising success has attended the growth of wheat sown in wheat stubble either disked or uncultivated. This method has averaged higher yields than late ploughing and nearly as much as early ploughing.

The results of the experiments show the possibility of increasing the county average.

Land that can be early ploughed or listed can not be fallowed profitably, although the yield per acre might be increased somewhat. Land that can not be prepared early could be fallowed more profitably than ploughed late and seeded. If free from perennial weeds or grasses it could still more profitably be seeded in the stubble, with no preparation unless perhaps a double-disking.

Studies of the method of fallow and the length of fallow season show that the effectiveness of fallow is not increased at this station by cultivation for a longer period than the growing season of the fallow year. The greater part of its benefits may be realized by cultivation in the period between harvest and seeding. The essential factor of the fallow is the maintenance of a bare surface, prevention of the growth of vegetation. The cultural methods by which this is accomplished are of minor importance from the standpoint of resultant yield. Their importance is in their relative cost and their effectiveness in preventing soil blowing.

Green manures, although more expensive, do not increase yields over bare fallow or even over early ploughing of land from which a crop is harvested.

The results of experiments with sod crops in rotations show them to be relatively unsuccessful themselves. Alfalfa is more successful than brome-grass, but is very depressing in its effect upon following crops. Wheat after corn averages about the same as the better methods of wheat after wheat. Kafir produces heavier yields of both grain and forage than corn, but wheat can not be sown immediately after kafir without great reduction in yield. The depressing effect of kafir is, however, eliminated by a single year of fallow or cropping. Barley, which is spring sown, follows kafir as well as it does other crops and produces relatively good yields. Winter wheat follows barley as well as it does wheat or other crops. This establishes in the rotation a place for barley between kafir and winter wheat.

The use of barnyard manure at different rates and in different positions in 3-year rotations of kafir, fallow and winter wheat for the 8-year period from 1913 to 1920, inclusive, has not had a measurable effect upon the yields of either wheat or kafir.

The experiments do not indicate that a reduction of the proportion of wheat to other crops would necessarily result in an increased average yield per acre of wheat. They do indicate, however, that the present average yield per acre is not as high as it should be. The most fertile field for the control of yields is the 90-day period between harvest and seeding. The more completely this is made a cultivation period the higher will yields rise above the minimum at which they now rest. An increase of 50 per cent is not impossible, and some part of it should

be realized through greater timeliness and efficiency of operations.

1117.—*Bromus Brachyantheca*, a Brazilian Winter Forage Plant.—DE ARRUENDA, J. M., in *Chacaras e Quintaes*, Vol. XXIV, No. 2, pp. 97-98. Sao Paulo, August 15, 1921.

For the last five years, the author has been growing in the State of Santa Caterina, Brazil, a *Graminea* for winter forage at an altitude of 4,000 feet. The plant, which he found wild in his fields, has been identified by Dr. Kuhlmann (Agrostologist), as *Bromus brachyantheca* Doell. The author states that this grass is resistant to cold, and that he is well satisfied with the good crops he has obtained.

LIVE STOCK AND BREEDING

1132.—Current Ideas Respecting the Licking Habit in Cattle and Its Causes. Results of Practical Experiments With Drugs in Prussia.—ZUNTZ, N., in the *Mitteilungen des Vereins Zur Forderung der Moorkultur in Deutschen Reiche*, Year XXXVII, pp. 437-440. Summarized in *Biedermann's Zentralblatt*, Year I, Part 1, pp. 33-34. Leipzig, 1921.

The analogy between the symptoms of the licking disease and those induced by depriving young growing animals of certain constituents of protein, such as tyrosin or tryptophane is, according to the author, so striking, that we are compelled to suppose that the habit of excessive licking in cattle is due to the absence of one or more of the substances necessary for the development of the organism. Further, the grazing experiments made by the author, the success of applying a dressing of sodium nitrate to the pastures, and the fact that the aftermath suited the animals better than the first cutting of hay, all suggested that the trouble was due to a deficiency of protein.

As is well-known, only a portion of the plant protein consumed enters into the formation of animal protein.

The richer the forage in protein, the easier becomes the elimination of the constituents which are not used in metabolism. Further, in many cases, the real remedy for the licking disease may consist, on the one hand, of increasing the absolute amount of protein, and on the other, of giving protein of a different composition by altering the botanical constituents of the forage, or the fertilizer, or using forage of a different quality, viz., at different stages of growth. The drying of the forage may also have some effect, seeing that under natural conditions certain components are washed out by the rain, and that the action of the sun produces chemical changes affecting some important substances present in fresh grass.

The author, after a consideration of all the data referring to the licking disease, and the conclusions that may be drawn from them, recommends the following prophylactic measures:—

(1) Care should be taken that sodium should not be lacking in the forage. The rest of the mineral constituents should form a basic mixture containing 600 to 750 mgm. of alkali equivalents.

(2) The protein content of the ration ought to be increased by the addition of concentrates rich in protein (linseed cake, palm-oil cake) suitable for ruminants.

(3) Hay must be made of the youngest grass possible; this has recently been advised by Neubauer, as the best means of remedying the lack of protein in forage intended for growing stock.

(4) In conclusion, the author lays great stress on the necessity of further experiment to determine whether the good effect of sodium nitrate observed by him is to be attributed to the sodium, or the nitrogen. In order to do this, one plot must be manured either with sodium chloride, or with sodium sulphate, at the rate of 780 to 1170 kg. per hectare, whilst another plot is manured with ammoniacal salts. During the execution of his experiments, the author still believed in the efficacy of the sodium in the sodium nitrate, but is now inclined to ascribe the favourable effect to the nitrogen content of the forage.

The author considers that ordinary drying causes the loss of certain indispensable substances; the truth of this opinion should be tested by comparing the products of the usual drying methods and those obtained by ensilage, or a modern drying process entailing the minimum loss of nutrient substances.

The Sunflower as a Silage Crop.—VINALL, H. N., in *United States Department of Agriculture, Bulletin* 1045, pp. 32. Washington, D.C., 1922.

In regions where the temperatures during the growing season are relatively low, and corn and sorghum do not produce heavy yields, the sunflower is recognized as an extremely valuable silage crop, and the acreage devoted to its production is increasing rapidly. Sunflowers have been found to be much more resistant to frost than corn. The best yields are obtained on rich clay loams well supplied with humus, but the crop has been grown successfully on sandy soil in Northern Michigan. Sunflowers will thrive on any soil which will produce a good crop of corn.

The same treatment of the soil that prepares the surface for corn planting will answer for sunflowers. The ground is usually ploughed in the spring and worked down with a spike-tooth harrow, or if fall ploughed it can be put in condition for planting by disking in the early spring.

Date-of-seeding tests indicate that sunflowers may be sown at the same time as the farmer plants corn.

It is considered best to cut the crop before the seeds have reached the hard dough stage. Most writers advise harvesting sunflowers for silage when only 50 to 60 per cent of the plants are in bloom. In dry climates the plants can be harvested at an earlier stage of maturity than in humid climates.

The ordinary silage cutter can be used for sunflowers, but one with a wide throat is desirable in order to accommodate the large heads. The knives should be adjusted to a quarter-inch cut and bolted on the cutter securely. Little trouble will be experienced in cutting sunflowers if the plants are fed into the silage cutter tops first. Sunflower silage packs more easily than corn silage. If the sunflowers are old and somewhat dry it will be necessary to add water along with the silage.

Sunflowers pack much more closely in the silo than corn. This means heavier silage and in large silos results in much greater pressure on the walls. The silo should be watched closely until the settling process is completed. If it shows signs of cracking serious trouble can be averted by reinforcing it with iron bands.

Most feeding experiments indicate that sunflower silage when properly made is equal to corn silage for milk-production purposes. It has also been fed at the Montana station to beef cattle, breeding ewes, and brood sows with good results.

The composition of sunflower silage, as shown by chemical analyses, compares very favourably with that of corn and the sorghums. While somewhat lower in carbohydrates or nitrogen-free extract than the corn and sorghums, it is higher in fat and protein. It is not equal in digestible nutrients to silage made from corn.

Most of the evidence from feeding trials conducted in the United States and Canada leads to the conclusion that even though animals may hesitate at first to eat sunflower silage freely, they soon become accustomed to it, and with the possible exception of corn silage, show no preference between it and other kinds of silage.

Sunflowers have been fed as a soiling crop to dairy cows by a number of experimenters, with good results. The chief disadvantage of this method of feeding is that the plants must be run through a cutter before they are used.

1136.—Contribution to Our Knowledge of the Toxic Products of New Hay.—ZCHOKKE, E., in the *Schweizer. Archiv. für Tierheilkunde*, Vol. LXIII, Part 5, pp. 192-202. Zurich, May, 1921.

Although it is well known that new sweating hay sometimes disagrees with

animals, especially horses, the scientific explanation of this fact has so far little foundation. The author, who bases his statements upon Laupper's observations on the spontaneous combustion of hay, concludes that, in new hay, chemical decomposition takes place resulting in the formation of extremely toxic substances. This decomposition is due, in the first place, to the action of enzymes, which on being set at liberty in the drying plant, cause a rise of temperature varying from 40°-45° C.

At this temperature, the conditions are favourable to the growth of many fungi that at once produce actual fermentation. Besides the *Mucorineae* and species of *Aspergillus*, the following micro-organisms also appear:—*Bact. coli*, *Bact. caefactor*, *Oidium lacti*, *Bact. fluorescens liquefaciens*, *Bact. fluorescens non liquefaciens*, *Bact. herbicola aureum*, *Bact. herbicola rubrum*, *Bact. mesentericus vulgatus*, *Bact. mycoides*, *Bact. Zopfii*, *Bact. aerogenes*, *Bact. megaterium*, *Bact. levans* and, especially, the thermophilous species, *Actinomyces Thermophilus*, *Thermomyces lanuginosus*, and *Thermosascus aurantiacus*, which can raise the temperature up to 73° C. During this time, evaporation takes place in the hay, and the water condenses on the cold parts. Probably metals such as iron and manganese, that can act even if only traces are present, bring about, like actual catalysts, oxidation phenomena (raising the temperature to 280°C), thus causing the formation of different new products. It is doubtless the iron which plays the role of fire-carrier and induces the ignition of the heated hay.

The products of this chemical decomposition are volatile compounds, ethereal oils, and although these gradually evaporate and finally completely disappear, while present, they endow the hay with certain toxic properties. The author further mentions a fact showing that toxic products can be formed even in old hay, if it be exposed to great heat. A fire having broken out in a barn, 65 cattle were taken back to the cowsheds some days later. Suddenly 15 of these animals were seized with diarrhoea, drowsiness, violent palpitations of the heart, while eczema made its appearance on their backs, etc. The origin of all these symptoms could be traced to the rain water dripping off the barn after having passed through the heated hay that was even partly carbonized by the fire. The drops falling on the animals' skin caused actual dermatitis, and gave rise to internal troubles when they found their way into the food in the feeding-troughs. Experiment proved that this water had fatal effects upon rabbits and mice.

All the observations made on the formation of these poisonous substances may be summarized as follows:—The quality and quantity of the new products arising in

fermenting hay depend on its composition and degree of maturity, the micro-organisms developing in it, and the intensity of the fermentation process.

Since this phenomenon cannot be prevented, the time-honoured precept of never using new hay until three months after it has been made, should be scrupulously obeyed.

FARM IMPLEMENTS

1158.—The "Maskell Junior Motor Plough." *The Implement and Machinery Review*, Vol. 46, No. 549, p. 1401. London, January 1, 1921.

The Maskell Junior Motor Plough is especially designed to meet the needs of those who require a smaller outfit than a tractor and a multiple furrow plough, and also those whose system of cultivation demands that operations be conducted in the minimum of space with the greatest possible economy of the headlands.

This machine will plough a furrow 6 to 9 in. deep and 9 to 12 in. wide under ordinary conditions and the adjustments for width and depth are made easily. It is a self-contained single-furrow machine with an over all length of 12 ft., a width of 4 ft. 3 in., a height of 3 ft. 6 in., and a weight of 10 cwt. Steering may be either by handles as the operator walks behind,—a preferable arrangement in difficult working conditions,—or from a detachable driver's seat. The machine can be swung around on its driving wheel, and the same lever which raises or lowers the plough is used to adjust the depth of ploughing as the work proceeds. The outfit is balanced on one large driving wheel, and is supported by an idler wheel on the left side, which acts as a slight drag and gives the plough a tendency to run to the left. This idler wheel is adjustable vertically to run in or out of the furrow. Power is supplied by a fan cooled V. twin cylinder Blackburn engine giving 10 h.p. on the brake, on petrol. The drive is transmitted to the multiple disc clutch by a chain and by gears from the clutch to the single driving wheel. A pulley drive is supplied for such power work as is consistent with the size of the engine. Cultivating and other tools can be used, while the outfit is made self-steering by a furrow guide wheel.

Manufacturers: Maskell Motor Plough Company, Advance Works, Jews Row, Wandsworth, London, S.W. 19.

AGRICULTURAL INDUSTRIES

1167.—Non-Alcoholic Wines and Ciders.—*La Cidrerie française*, Year 33, No. 8, pp. 173-177. Paris, August, 1921.

The President of the General Syndicate of Ciders and Fruits for Cider-Making of France made enquiries respecting the manufacture of non-alcoholic ciders and received

the following note from the French Commercial Office for Switzerland.

Note on the Manufacture of Non-Alcoholic Wines and Ciders in Switzerland.—In order to obtain a non-alcoholic cider of good quality, it is necessary to mix apples of various kinds (sour and sweet), for the flavour depends upon the cider containing sugar, tannin, acids in certain proportions. The apples should be chosen by an expert, for the kind of fruit selected determines the quality and clarity of the juice extracted. If sweet and acid apples are mixed in the right proportions, the juice expressed should be relatively clear and not require filtering.

Fruits of different kinds are not mixed as a rule, the apple juice being the extract of apples without any admixture of pears or other fruit.

The apples or grapes should be ripe, but not over-ripe. In no case is fruit used that is not sufficiently mature for the table. Should they be dusty or covered with soil, they may be washed, but if clean this is optional.

To extract the juice, the fruit is first pounded in stone mortars, and the pomace thus obtained extracted by a hydraulic press. It is of the greatest importance that, during pressing and the subsequent operations, the juice should never come into contact with iron, which imparts a disagreeable taste. Iron utensils ought therefore never to be used.

Pomace is not tanned before pressing; in fact, all the operations must be carried out rapidly so that the juice will not remain too long in contact with the air, which might start fermentation.

The hydraulic presses used in most of the Swiss factories are supplied by Messrs. Rauchenbach of Schaffhausen (Switzerland).

As soon as the juice leaves the hydraulic press, it passes through a pipe to a metal sterilizing apparatus filled with water at a temperature of 66°C. to 70°C. The juice, which is in a spiral aluminum tube, remains in the sterilizer for half an hour at most, after which the operation is complete. It should be noted that, after this stage, the juice should never come into contact with the air.

After sterilization, the cider or wine is taken into receptacles holding 15 to 20 hectolitres, from which all the air has previously been expelled. In these it remains for some weeks or even months before being bottled. The receptacles are provided with a fermentation indicator consisting of a black fluid contained in a glass spiral in the form of a horizontally-placed S, which turns white as soon as fermentation begins.

Before bottling, the juice is filtered through asbestos and can be filtered several times if necessary, in order to render it perfectly clear, but it is better only to filter it once, for the re-

petition of the process affects the taste of the liquid. Asbestos filters are well-known, and their use is not a trade secret. They are made in Switzerland by Messrs. Th. Seitz at Kreuznach-am-Rhein, and Messrs. Hoeny, Mechanische Werkstatte at Ober Meilen.

The bottles used for alcohol-free wine or cider are not sterilized before they are filled, but are very carefully washed. It should be noted that the success of the preparation largely depends upon the scrupulous cleanliness of all the apparatus and bottles used.

The bottles, when filled with juice, are placed open in a metal vat provided with a cover. The vat is then filled with water at about 70°C., the water coming up as far as the necks of the bottles. Sterilization is complete at the end of about half an hour. The bottles should be corked at once, to prevent the juice cooling. Metallic caps fitted inside with a ring of cork, are generally used in mechanical corking. This process appears the surest and most economical. It is necessary for the bottles to be hermetically closed in order to prevent any subsequent fermentation of the juice.

In making alcohol-free champagne or sparkling wines the same process is employed up to and including the bottling. Before sterilization, the bottled juice is subjected to carbon dioxide under pressure of 2 to 6 atmospheres. This pressure varies according to the temperature of the wines, and the nature of the product required. It should be 2 atmospheres in the case of sparkling wines and 6 or 7 in that of champagne. A lemonade apparatus is generally used for introducing the carbon dioxide into the bottles, which should be made to withstand the pressure.

The corking operation is the same as for ordinary champagne bottles, the cork stopper being wired on. Sterilization is effected later in the autoclave; the pressure in the interior of the apparatus must be increased progressively as the temperature arises, in such manner that the external pressure balances the pressure inside the bottles. This is a very delicate stage of the manufacture, as the bottles easily explode. The bottles are then laid down in a cool place.

The pomace is as a rule used for the making of preserves, or for distillation. It is not dried, but is employed in its natural condition.

The "Alkoholfreie Weine und Conservenfabrik Meilen A.-G.," at Meilen, made apple-honey for some years, but has since given up doing so. This product is obtained by merely evaporating the juice in the open air in a jacketed apparatus similar in shape to a kind of retort, that is always to be found in jam factories.

In the manufacture of alcohol-free wines and ciders, and also in that of apple-honey,

no foreign substance (such as glycerine for instance,) is ever introduced to promote coagulation.

The temperature of the work-rooms is not of special importance, for the operations must be performed as quickly as possible.

As regards the utilization of the by-products, it appears from the experience of the Swiss factory, that all that can be done is to use them for distillation, or sell them to preserve factories. Generally, a preserve and jam factory is annexed to the alcohol-free wine factory.

The process described has not been patented, but patent machines are used, which can be procured, on application to the firms whose addresses are given in this abstract.

1170.—**The Oxyhydriase of Milk.**—ALOY, J., and VALDIGNIE in the *Comptes rendus des Seances de la Societe de Biologie*, Vol. LXXXV, No. 26, pp. 333-334. Paris, July 16, 1921.

The milk ferment discovered by Schar-dinger that decolorizes methyl-blue in the presence of formaldehyde, belongs to the class of ferments possessing both oxidizing and hydrogenating properties, which are known as oxyhydriases. The authors isolated this ferment from milk by saturating it with powdered sodium chloride; leaving it to stand for 12 hours, then filtering it and finally precipitating the filtrate by a semi-saturated solution of ammonium sulphate.

The oxyhydriase thus separated gives the reactions of protein substances; it is insoluble in water, soluble in solutions of neutral salts, and precipitated from these solutions by acetic acid. It contains a considerable amount of phosphorus and iron and is thus a phospho-proteid.

Dried Milks.—SHERMAN, H. C., in *American Journal of Public Health*, Vol. 12, No. 2, pp. 113-116. Boston, 1922.

The annual report of the committee on nutritional problems of the American Public Health Association deals exclusively with dried milk with special reference to the possible development of the dry milk industry as a means of increasing, conserving, and marketing the milk supply. The report discusses in turn the sanitary aspects of the milk drying industry, the nutritive value of dried milk and its products, and the possible effects of a dry milk industry upon the dairy industry and milk supply as a whole. It is shown that ordinary processes of commercial drying are more efficient than pasteurization in destroying the bacteria originally present in the milk, and that the dried product is no more subject to secondary contamination than any other dried food. In regard to its nutritive value, dried milk is considered to be equal in value to pasteurized milk, the only

significant change occurring in either manipulation, if properly conducted, being in the loss of the antiscorbutic vitamin.

In regard to the effects of the dry milk industry upon the dairy industry, it is stated that "the opinion is widely held, and in our judgment well founded, that the dry milk industry will not seriously compete with or in any way injure the fluid milk industry as it now exists, but rather, will supplement it and make possible the good use of its seasonal surplus; that with increasing recognition by consumers of the great importance of milk as food for adults as well as for children, dried milk will come to be largely used in cookery without diminishing the consumption of milk in fluid form; that the drying of milk both as a means of preservation and of greatly reducing transportation costs will permit the extension of the milk industry into regions too distant from large markets to ship milk in fluid form; that because of this extension of the source of supply, the greater consumption of milk in its different forms should not necessarily result in higher prices; that the drying of milk will greatly facilitate the production and handling of milk in the South, where lack of natural ice so greatly hampers the fluid milk industry and where an increased use of milk in the diet is so urgently needed, and will doubtless do more than anything else toward the lowering of the infant death rate and the suppression of pellagra among adults.

PLANT DISEASES

1179.—**Phytophthora sp. and Septoria Lycopersici on Tomato Seedlings**, in *New South Wales*.—DARNELL-SMITH, G. P., in *The Agricultural Gazette of New South Wales*, Vol. XXXII, Pt. 8, p. 577. Sydney, August, 1921.

Tomato seedlings in certain districts in New South Wales were attacked last year by blight (*Phytophthora* sp.) and leaf spot (*Septoria Lycopersici*).

The part attacked is generally some portion of the stem in the majority of cases at or near the ground level. The seedlings fall over and wilt.

S. Lycopersici is recognized by pale or ochre coloured spots on which are produced numerous minute black bodies which contain the spores. Affected leaves have a tendency to curl.

The following control measures are recommended by the author:—(1) Remove and burn all diseased plants; (2) Spray the rest with Bordeaux mixture; should wet weather prevail, other sprayings may be necessary at intervals of about 10 days; (3) Avoid keeping the seed-bed too moist; (4) Water the soil rather than the plants; Shelter the beds with some impervious material during damp weather.

INJURIOUS INSECTS

Fighting Insects With Aeroplanes.—NEILLIE, C. R., and HONSER, J. S., in *National Geographical Magazine*, Vol. 41, No. 3, pp. 333-338. Washington, D.C., March, 1922.

An account is given of the successful use of aeroplanes in dusting tall trees infested with *Ceratomia catalpae*, Bdv., in Ohio. The experiment was made against the second brood of the moth, the plane used being equipped with a metal box secured to the fuselage. This box has a capacity for holding a little more than 100 lb. of dry lead arsenate. At the bottom a sliding gate is arranged to be operated by a handle accessible to the observer. A crank at the top is connected to a revolving mechanism at the bottom by a sprocket chain, which, when placed in motion, releases the powder through the previously opened sliding gate. The dust thus dropped into the air current set up by the revolving propeller is violently agitated and forms a dense white cloud, which trails out behind the moving plane.

The grove of *Catalpa* treated by this method was situated on level ground, and was a plot 800 ft. long and 325 ft. wide containing 4,815 trees 25 to 30 ft. high. The poison was applied between 3 and 4 p.m. on August 3rd, 1921, under almost ideal weather conditions, a steady wind blowing at from 8 to 11 miles an hour. The plane flew at 80 miles an hour at an altitude of from 20 to 30 feet and parallel to the grove, 53 yards to the windward of it. The dust was carried by the wind over the grove, every tree being covered. The plane distributed about 175 lb. of poison, and subsequent examinations showed that not more than one per cent of the larvae remained alive on the trees. The poison can be placed with marked precision at any point intended, thus dispelling the expectation that it would be wholly beyond control as a result of the air currents.

With further development and improvements this should prove a successful means of controlling forest insects, but its usefulness in treating cotton or other low-growing crops or even large fruit orchards still remains to be proved.

Apanteles Melanoscelus, an Imported Parasite of the Gipsy Moth.—CROSSMAN, S. S., in *United States Department of Agriculture Bulletin* 1028, pp. 25. Washington, D.C., 1922.

This is a report of studies of one of the parasites imported from abroad during the course of work against the gipsy and brown-tail moths. The first part (pp. 2-14) contains a description of the species and an account of its life history and habits. *A. melanoscelus* Ratz. is close to *A. solitarius* Ratz., but the differences are thought to be

sufficiently well marked and sufficiently constant to justify holding the two forms distinct. The methods used in the biological work are briefly described.

It hibernates as a third-stage maggot within its tough sulphur-yellow cocoon, and, under field conditions, the adults emerge over a period of about three weeks. Emergence is at its height when the gipsy moth egg hatching is at its maximum, usually during the second week in May. As in the case of many parasitic Hymenoptera, they often reproduce parthenogenetically. The greatest number of eggs secured from a single female was 535, and a dissection of this individual showed that her ovaries still contained about 150 mature eggs and about 200 eggs in different stages of development, indicating that under natural conditions a female is capable of ovipositing in the vicinity of 1,000 eggs. From 48 to 72 hours are required for the incubation of the egg. There are three larval stages, which, depending upon the temperature, vary for the first stage from 2 to 3 days in the spring generation and from 6 to 8 days in the summer generation, for the second stage from 2 to 3 days by the first-generation larva and from 5 to 7 days by the second generation, and the period spent by the third-stage maggot within its host varies from a few hours to 2 days with the spring generation and as long as 3 days with the summer generation. The pupal stage lasts from 5 to 9 days.

The seasonal history varies considerably with the season and the issuance of adults of *A. melanoscelus* from their hibernating cocoons, commencing about the time of maximum hatch of the gipsy-moth egg, usually near the middle of the second week in May. Under field conditions, females of *A. melanoscelus* do not begin to oviposit immediately, for the bulk of issuance of the spring generation parasite maggots is around June 12. The adults which develop from these maggots are found issuing from 7 to 11 days later. Cocoons of the second generation, or those in which the parasite is to pass the winter begin to appear about July 4, but usually not in abundance until the second week in July.

The records show that healthy gipsy-moth larvae eat from two to three times as much as those which contain parasite larvae. The gipsy-moth larva from which a parasite larva has issued eats no more, although it may live a few hours or as long as 2 weeks, the average being 7 days. While in field-collected material in this country it has only been reared from the gipsy moth, it is recorded as a parasite of the satin moth (*Stilpnotia salicis* L.) in Europe. It is thought to be responsible for the death of many tussock-moth larvae during an outbreak of the pest at Somerville, Mass., in August, 1920. In experimental work it was reared from several larvae, including the ten

caterpillar, the forest tent-caterpillar, the white-marked tussock moth, the brown-tail moth, and *Olene basiflava* Pack.

The second part of the report (pp. 14-25) deals with the introduction and establishment of this parasite in the United States, and a map is attached which shows the dispersions of the gipsy moth and *A. melanoscelsus* in New England in 1920. It is now firmly established and is spreading rapidly from the colonies which have been liberated, and is increasing in spite of its being heavily parasitized by secondaries. The fact that it is able to complete its life cycle on several native insects adds considerably to its value as a permanent parasite, and makes its permanent establishment more certain than if the gipsy moth were its only host.

877.—*Stilpnctia Salicis* a Macrolepidopteron Injurious to Poplars and Willows, Reported for the First Time From Massachusetts, and New Hampshire.—BURGESS, A. F., in *United States Department of Agriculture, Department Circular*, 167, 16 pp. Washington, D.C., May 1921.

The satin moth (*Stilpnctia salicis* L.)—an insect well known in Europe for the injury caused by its larvae to poplars and willows—was reported for the first time in the United States about July 1, 1920. At this date, it was found that a number of poplar trees (*Populus monilifera* var. *angulata*) on the Malden and Medford line north of Boston, Massachusetts, were being defoliated by the larvae of this insect. A hasty examination showed that the most severe defoliation was in the region where the caterpillars were first reported, and several trees in a small group of *P. pyramidalis* (Lombardy poplar) had been completely stripped.

Observations in the field, in 1920, indicated that the small larvae of *St. salicis* chiefly fed on different species of poplar, those most severely attacked being the Carolina (*P. monilifera* var. *angulata*), Lombardy (*P. pyramidalis*) Balm of Gilead (*P. balsamifera*) and Silver Leaf (*P. alba*).

As regards the distribution of the satin moth in the United States, the insect is now known to occur over an area of 642 square miles, including 60 towns in Massachusetts, and 4 in New Hampshire. Probably a few of the insects had already existed for some years in the locality where they were first observed.

While it is impossible to determine the original source of the infestation it is very probable that *St. Salicis* was brought into the United States during the dormant season in crevices of the bark of live or dead trees; bits of infected bark mixed with packing material could easily furnish a means of transporting the insect, for the hibernating webs of the small larvae concealed in the crevices of bark are so inconspicuous as to escape even careful inspection.

The larvae and pupae of the satin moth are effectively attacked by the adult and larval forms of *Calosoma sycophanta*. Another formidable enemy of the larger larvae of *St. salicis* is *Compsilura concinnata* Meigen.

Telenomus californicus Ash. is a parasite that has been reared from the eggs of the satin moth. The prospect of controlling the latter by parasites is encouraging but it may be necessary to import into the United States from Europe some of its enemies that do not at present exist in the former country.

Time has not permitted experiments to be carried out in the infected area to determine the most effective remedies against *St. salicis*, but from what is so far known concerning the latter—the paper analysed gives the data collected during the summer of 1920 respecting the stages of development and the habits of the insect—the following treatment would seem advisable.

(1) Spray poplars and willows as soon as they are in full leaf with arsenate of lead at the rate of 10 lbs. to 100 gallons of water, using soft soap to make the remedy adhere to the leaves.

(2) If the infestation is severe, it may be necessary to repeat the operation by the middle of June.

(3) If egg clusters are abundant on the trees in July, spray again with the same material about August 1st.

The experience of a full year's work on this insect will probably result in a modification of these recommendations.

Experiments With Contact Dust.—HEADLEE, T. J., and RUDOLFS, W., in *Journal of Economic Entomology*, Vol. 15, No. 1, pp. 75-81. Concord, N.H., 1922.

From the data here presented it is concluded (1) that proper dust carriers impregnated with a 2 per cent nicotine are as effective in the control of the pink and green aphid on potatoes as is nicotine delivered in a liquid form; (2) that nicotine delivered as a dust has the disadvantages of a much longer period of kill than that necessary for nicotine delivered as a liquid, rendering the work of the dust liable to serious interference by rainfall, and the cost is materially larger than control with nicotine delivered as a liquid; (3) that the advantages of nicotine delivered as a dust are primarily concerned with the increased speed in covering large acreages and the freedom from the necessity of a nearby water supply; (4) that there occurs in all carriers with which the authors have experimented a tremendous waste of nicotine; and (5) that the improvement of nicotine dust is to be sought in the more rapid evolution of the 2 per cent or less of nicotine, which is within the range of reasonable practice, or in the delivery of such nicotine as is evolved in close contact with the bodies of the lice, or in developing along both these lines.

OTHER ARTICLES ON SCIENCE AND PRACTICE OF AGRICULTURE

On account of lack of space the following articles in the International Review of the Science and Practice of Agriculture can only be referred to. Anyone desiring the articles may obtain them from the Institute Branch, Department of Agriculture, Ottawa.

1090.—**The Plough as a Means of Making Gradually Sloping Terraces.**—GIANNONI, I., in *Il Coltivatore*, year 67, No. 23, pp. 133-138. Casale Monferrato, August 30, 1921.

1094.—**Leucite.**—GIANNONI, J., *La Leucite, Memoria premiata col Premio Cesare Zucchini della R. Università di Bologna*, pp. 56, bibliography of 74 works. Osimo, 1921.

1095.—**Radioactivity Experiments in Spain.**—*Estacion Central de Ensayos de Semillas La Moncloa, Bolein Trimestrial*, Year I, No. 2, pp. 7-8. Madrid, June, 1921.

1106.—**Experiments on Flax Hybrids.**—BLARINGHEM, L., in the *Comptes rendus de l'Academie des Sciences*, Vol. 173, No. 5, pp. 329-331. Paris, August 1, 1921.

1109.—**Commercial Production of Seed According to the Swedish Improved Method, and the Progress Already Made in Canada and New South Wales.**—I. BREAKWELL, E., "The Production of Better Seed in Other Countries," *The Agricultural Gazette of New South Wales*, Vol. XXXII, Pt. 4, pp. 245-248. Sydney, April, 1921.—II. NEWMAN, L. H., "Seed Centres in Canada," *The Agricultural Gazette of Canada*, Vol. VIII, No. 2, pp. 212-214.—III. CUTLER, G. H., "The Beginning of an Important Movement for Supplying Pure Seed." *Ibid.*, p. 154. Ottawa, March-April, 1921.

1111.—**Experimental Cultivation of Foreign Wheat and Oats in Italy.**—POGGI, G., in *Il Coltivatore*, Vol. 67, No. 24, pp. 174-181, Casale Monferrato, August 30, 1921.—ROSSI, G., in the *Rivista di Agricoltura*, Vol. XXIV, No. 34, pp. 481-482. Piacenza, August 26, 1921.

1118.—**Experiments in Growing Lucerne on Dry Soils in Italy.**—*Il Coltivatore*, Vol. 56, No. 21, pp. 81-83. Casale Monferrato, July 30, 1921.

1121.—**Hemp Stalks as a Raw Material for Paper Manufacture.**—RASSOW, B., and ZCSHENDERLEIN, A., in the *Zeitschrift fur*

angewandte Chemie, Year XXXIV, No. 41, pp. 204-206. Leipzig, May 24, 1921.

1135.—**The Chemical Composition and Forage Value of the Straw of Different Varieties of Wheat Grown Under the Same Conditions, in Italy.**—ALBERTONI, F., and ROSINELLI, G., in *Le Stazioni sperimentali italiane*, Vol. LIV, Parts 4-6, pp. 129-144. Bibliography of 6 works. Modena, 1921.

1140.—**A German Study of the Transmission of Coat Colour in Thoroughbreds.**—STERNFIELD, R., in the *Zeitschrift fur Gestutkunde und Pferdezucht*, Year XVI, Part 4, pp. 69-76. Hanover, 1921.

1146.—**Experiments Made in the United States on the Effect of Hydrocyanic Acid in Sudan Grass on Cattle.**—SWANSON, C. O., in *Journal of the American Society of Agronomy*, Vol. XIII, No. 1, pp. 33-36. Washington, January, 1921.

1147.—**German Experiments on the Value of Urea in the Feeding of Sheep and Other Ruminants.**—VOLTZ, W., in I. *Mitteilungen der Deutschen Landwirtschaftsgesellschaft*, Year XXXIV, No. 27, pp. 372-375. Berlin, July 1919; II. *Biedermanns Zentralblatt*, Year XLIX, Part 7, pp. 269-272. Leipzig, July 1920.

1150.—**German Experiments Made on Feeding Pigs With Rations Containing Large Quantities of Fish Meal.**—MULLER, K., in the *Deutsche Landwirtschaftliche Tierzucht*, Year XXV, No. 32, pp. 333-334. Hanover, August, 1921.

1156.—**Decree of French Minister of Agriculture Dated June 17, 1921, Respecting Enterprises for Mechanical Ploughing.**—*Journal officiel de la Republique francaise*, Year LIII, No. 163, pp. 7009-7010. Paris, June 19, 1921.

1159.—**The Beaters of Threshing Machines.**—CASTELLI, M., in *Il Villaggio ed i Campi*, Year XLVI, No. 23, p. 2. Rome, June 4, 1921.

1161.—**Utilization of Waste Farm Products for Fuel.**—*Indian Engineering*, Vol. LXIX, No. 26, p. 362. Calcutta, June 25, 1921.

1171.—**Gerome or Gerardmer Cheese.**—BLIN, H., in *L'Alimentation moderne et les Industries annexes*, Year XIX, New Series, No. 16, pp. 231-232. Paris, July 1921.

THE INTERNATIONAL REVIEW OF AGRICULTURAL ECONOMICS.

The following is a brief indication of the contents of the more important articles in the May and June numbers of the Institute Bulletin. Persons interested in any of the articles may obtain the original Bulletin on application to the Institute Branch, Department of Agriculture, so long as the supply for distribution is not exhausted.

MAY NUMBER

Measures Relating to Agricultural Co-operation in Portugal.—21 pages. An account of the legislation adopted in Portugal during and since the war for the encouragement of the spirit of association among the rural classes. A summary of the legislation regarding co-operative agricultural credit banks is given as well as an account of the operations of these banks. There is also a detailed description of the agricultural syndicates.

The Work of the War Finance Corporation of the United States in Aid of Agriculture.—14 pages. Originally created as a war agency under an Act dated April 5, 1918, the War Finance Corporation was empowered by the American Congress in March, 1919, to assist in the task of reconstruction. It was authorized, in order to promote commerce with foreign nations through the extension of credits and to aid in the transition from the conditions of war to those of peace, to make advances not exceeding \$1,000,000,000 to American exporters and American banking institutions for the purpose of financing the exportation of domestic products. This authority was exercised until May, 1920, when the activities of the Corporation were suspended. In the autumn of 1920 when the collapse in commodity markets became acute, the question of exports became a matter of general interest, and the Congress, in January, 1921, directed that the activities of the Corporation be resumed.

The article describes the business organization of the corporation and gives an account of the extension of its powers embodied in the Agricultural Credits Act of August 24, 1921. The work of the corporation in financing exports is described and details of the advances of funds for different purposes are given.

The Maintenance of the Agricultural Labour Supply in England and Wales During the War.—28 pages. The third and last installment of this article. It gives an account of the work of women on the land, also of other sources of labour, such as Belgian refugees, Danish labourers, conscientious objectors, national service volunteers, school boys, civil servants, etc.

Measures Adopted During the War to Maintain the Supply of Agricultural Labour

in Italy.—30 pages. The immense quantities of material of all kinds required for military operations and for the needs of the Italian army, the increasing difficulty in obtaining supplies from abroad, rendering necessary the maximum utilization of internal resources, the calling up of all military classes and of those who had undergone a second medical examination after being pronounced unfit, the necessity of safeguarding the sources of national production, and for maintaining intact the economic forces of the country, were all factors converging to lead the Italian Government to issue a series of measures during the war intended to ensure to farms the supply of labour essential to their working.

During the earlier period measures of a general character were promulgated for the releasing of soldiers who could be utilized by farmers. As mobilization proceeded and labour became less and less available, the need was felt for special and wider measures in view of the requirements of agriculture. In the present article these measures are described in considerable detail. An account is also given of the employment of prisoners of war.

Other articles in the May number are: State Aid to Agricultural Co-operation in Bulgaria; the Establishment of a Co-operative Society for the Purchase and Sale of Land in Czecho-Slovakia; Agricultural Co-operation in Germany in 1919-20; Agricultural Co-operation in England and Wales in 1920-21; New Types of Tenant Farmer Agreements in Belgium; Land Reform Legislation in Lithuania; Ownership and Price of Land in Southern Rhodesia.

JUNE NUMBER

The Capitalization of Rural Co-operative Societies in Germany.—17 pages. The German juridical doctrine recognizes as "Genossenschaften" all independent societies having a corporate existence other than the State and the Communes. To these "Genossenschaften," in the widest sense of the word, belong capitalist companies (of which the share companies are the most important form), co-operative societies based on the real property of the members (*Realgenossenschaften*) and co-operative societies composed of individuals independently of the possession of real property (*Personalgenossenschaften*). The *Realgenossenschaften* are for the most part compulsory associations. A special law regulates the admission of members and the juridical relations of the members to one another and to the association; often, too, the method of conducting the business and the powers of the public authorities to make regulations for the

association are determined in advance. In some cases the right of the public authorities to supervise the associations is also contemplated. Amongst the co-operative societies of this kind are the societies for drainage and irrigation. The wish of the individual to belong to the society and to derive benefit from it or not has no special importance in these cases. In the interests of the community, the individual for whose advantage the society is formed is compelled to become and to remain a member. And the compulsion reaches such a point that the lands on which the society conducts its operations continue to belong to it even if they change hands, so that the new owner becomes compulsorily a member, while the original owner, when he transfers the property, withdraws from the association.

The "free" co-operative society, on the other hand, does not owe its formation to any compulsion. It cannot be a *Realgenossenschaft* and it is not usually a capitalist company, but is a *Personalgenossenschaft*. The persons who compose it, the members, are its supports and its object is to serve its members and, in turn, it is served by the capital, whereas in the commercial company (of which the typical form is the share company) it is the capital which commands. In some special cases a "free" co-operative society is established under the juridical form of a share company, but it usually assumes the form of a co-operative society registered under the law of 1889 (*Gesetz betreffend die Erwerbsund Wirtschaftsgenossenschaften*). The registered co-operative society is the form of undertaking adapted to the combination of persons economically weak. It allows such persons to develop a powerful economic action, to utilize the means of capitalistic activity and at the same time protects them against the harm which may result from it. The co-operative society is a potent instrument for individual initiative, it promotes and strengthens in its members the consciousness of their own liability and trains them in independent management. The co-operative society puts self-interest at the service of the community.

This article deals only with the free rural co-operative societies, that is the co-operative societies which serve the population of the country districts. Amongst those there are many agricultural co-operative societies, which aim exclusively at serving the agricul-

turist (co-operative dairy societies, co-operative vine-growers' societies, co-operative threshing societies, etc.), but there are others which work in the interests of the rural population as a whole, such, for example, as rural credit societies (loan banks, Raiffeisen societies), co-operative societies for the supply of electricity, etc.

The rural co-operative societies may be divided into two groups—the co-operative credit societies and the so-called co-operative trading societies.

By capitalization must be understood the supply of capital and distinction must be made between the supply of capital for the working of the society itself and the employment of capital in the working of other undertakings.

The subject is covered under the following heads: The Supply of Capital for the Societies' Own Working; Owned Capital and the Methods of Obtaining It; The Economic Importance of Owned Capital; Borrowed Capital and The Means of Obtaining It; The Relations Between the Supply and the Employment of Capital.

Agricultural Credit Facilities in Great Britain and Ireland During the War.—10 pages. The need of additional credit facilities were not very strongly felt by the farmers of Great Britain and Ireland during the early part of the war, and, for reasons of public economy, some of the facilities which they had previously enjoyed were restricted. It was not until efforts were being made in 1917 largely to increase the area of arable land that some steps were taken to give greater opportunities to farmers to obtain the capital required for putting the scheme into execution. The article indicates for each of the three kingdoms separately the initial restrictions (if any) and the subsequent increase of agricultural credit facilities.

Other articles in the June number are:—The General Confederation of the Vine Growers of France; A French Co-operative Society of Seed Producers; Agricultural Co-operation in Greece; The Problem of Credit for Russian Agriculture; The Third International Congress on the Teaching of Household Management; The Subdivision of Landed Property in Egypt; The Establishment of Military Agricultural Colonies in Mexico; French Colonization in Morocco; The Cultivation of Allotments in Austria During the War.

AGRICULTURAL STATISTICS

THE CEREAL CROPS OF 1922

WORLD'S WHEAT REQUIREMENTS AND SUPPLIES

A good deal has been written recently by the American Trade Journals in order to explain the steady increase in the price of wheat which, since the low point in August, has risen in North America from 12 to 15 cents a bushel. For a time the congestion in transportation facilities and the threatened war with Turkey were stressed, rather than fundamental conditions. From the following tables these conditions appear so striking that such claims have by comparison but little value. It is perhaps not amiss that some congestion should have existed for, even under the conditions of which there has been complaint, the United States shipped 38 million bushels of wheat in August to Canada's 14 million. Although the United States figures are not available for September, the total shipments from North America, as reported by Mr. Broomhall, are as large as those of August, while the shipments from Canada were only a little over 12 million bushels. The fact is a readjustment was due to a figure more nearly comparable to that of other commodities, and to the very striking rise at Liverpool of some 25 cents a bushel. The Europeans as well as the Americans had overstayed their market. Justification for the rise is basic. It represents the European shortage in production and supply. The Europeans have been tardy in engaging their limited credit, hoping perhaps to put off the evil day of heavy importations until they had used up as much as possible their own crops. However, impending future needs at last have forced them into the market for heavy commitments which may not even be met by the large prospective supplies in North America. They must see to it that these supplies are kept moving in unprecedented quantities, and it is only enhanced prices that can accomplish that result.

It is true that the world's exports for August are fairly large at 65 million bushels, but last year when Europe had reaped a crop as much larger than the preceding one as the present crop is smaller than last year's, the August exports were 80 million bushels, the United States shipping the unprecedented total of 66 million. At that time the prices were over 50 cents per bushel in excess of present prices, and European currencies did not have the increased purchasing power which they enjoy today. Still, last year in

the months of October, November and December, when Australia was shipping very heavily, the world's total exports ran 60,473,000, 63,187,000 and 63,769,000 bushels respectively. Now Australia is out of the market and Argentina is on the very point of dropping out. Certainly, in order to meet the present increased world's demand, at least from 125 to 150 million bushels larger than the demand of last year, and with Australia and Argentina already sold out, the shipments of Canada and the United States will have to be abnormally heavy. It will probably be nearly March next before the new crop of distant Australia and Argentina can reach Europe in large volume; in the meantime, it is only firm prices, if not steadily increasing prices, that can assure the volume of movement from North America that can fill the world's urgent needs.

These facts are so important in Canada's present conditions that it is imperative the details should be presented and carefully examined in the following series of tables, which deal principally with wheat, but also to a lesser extent with rye, oats and barley. It is perhaps not sufficiently realized that such satisfactory data, furnished from all countries so early in the crop season, have been possible only because of the admirable work during the past 11 years of the International Institute of Agriculture. These figures, when cabled or otherwise published by the Institute, at once become public property, and are often used by Governments and officials and individuals without any reference to the agency which has so skilfully organized them, and is still energetically engaged in improving the service. Generally the data used in these reports of the world's acreage, production and trade in respect of the different cereals are abstracted from the Bulletin of the International Institute of Agriculture entitled "The International Crop Report and Agricultural Statistics." Only, in the case of figures for any country not being for the moment available, estimates are made by this Branch or accepted from other reliable sources based on acreage and the most recent condition reports. Frequently the Institute cables the latest data and this source of information is always preferred.

THE AGRICULTURAL GAZETTE OF CANADA

TABLE I

WORLD'S PRODUCTION OF WHEAT

European countries as at present	1922	1921	Average 1916-20	Pre-war average 1909-13	European countries as before the war
	Bushels	Bushels	Bushels	Bushels	
Great Britain and Ireland	64,000,000	73,795,000	68,681,000	59,640,000	Great Britain and Ireland.
France (a).....	235,380,000	323,470,000	213,012,000	317,639,000	France.
Germany.....	69,666,000	107,800,000	81,143,000	152,120,000	Germany (b)
Belgium.....	9,870,000	14,495,000	7,452,000	14,894,000	Belgium..
Netherlands.....	5,210,000	8,686,000	5,006,000	4,896,000	Netherlands.
Denmark.....	6,400,000*	11,144,000	5,997,000	5,344,000	Denmark.
Norway.....	548,000	972,000	781,000	306,000	Norway.
Sweden.....	8,478,000	12,577,000	8,947,000	8,103,000	Sweden.
Finland.....	176,000	280,000	254,000	251,000	Finland.
Spain.....	125,908,000	145,151,000	139,715,000	130,447,000	Spain.
Portugal.....	5,600,000*	8,613,000	8,597,000	6,985,000	Portugal.
Italy.....	162,407,000	192,838,000	168,187,000	183,336,000	Italy.
Switzerland.....	3,571,000	5,284,000	6,029,000	3,314,000	Switzerland.
Luxemburg.....	500,000	661,000	781,000	615,000	Luxemburg.
Poland (new).....	44,794,000	37,410,000	22,741,000	19,045,000	Poland (Russian)
Czecho-Slovakia.....	30,472,000	38,682,000	26,362,000		
Austria.....	5,600,000*	6,452,000	5,269,000	60,842,000	Austria.
Hungary.....	43,952,000	52,716,000	38,295,000	169,645,000	Hungary.
Jugo-Slavia.....	42,000,000*	51,867,000	43,001,000	14,746,000	Serbia.
Roumania.....	87,762,000	78,564,000	61,310,000	87,792,000	Roumania.
Bulgaria.....	34,344,000	42,510,000	30,000,000	41,994,000	Bulgaria.
Greece.....	9,553,000	11,170,000	11,001,000	9,400,000	Greece.
Total Europe.....	996,185,000	1,225,137,000	952,561,000	1,291,354,000	

(a) Including Alsace-Lorraine for first three columns.

(b) Including Alsace-Lorraine for pre-war average.

Countries	1922	1921	Average 1916-20	Pre-war average 1909-13
	Bushels	Bushels	Bushels	Bushels
<i>North America—</i>				
Canada.....	388,773,000	300,858,000	228,410,000	197,118,000
United States.....	810,123,000	794,893,000	799,000,000	686,697,000
Total North America.....	1,198,896,000	1,095,751,000	1,027,410,000	883,815,000
<i>Asia—</i>				
India.....	366,351,000	250,356,000	344,736,000	351,767,000
Japan.....	26,495,000	26,921,000	30,246,000	24,166,000
Total Asia.....	392,846,000	277,277,000	374,982,000	375,933,000
<i>Africa—</i>				
Algeria.....	18,233,000	33,764,000	25,730,000	34,998,000
Egypt.....	36,648,000	37,011,000	32,073,000	34,121,000
Morocco.....	9,553,000	17,466,000	19,025,000	18,202,000
Tunis.....	3,307,000	10,623,000	7,395,000	6,224,000
South Africa.....	8,000,000*	8,689,000	7,304,000	6,127,000
Total Africa.....	75,741,000	107,553,000	91,527,000	99,672,000
<i>South America—</i>				
Argentina.....	200,000,000*	154,875,000	171,017,000	147,072,000
Chili.....	22,000,000*	22,179,000	21,801,000	21,243,000
Uruguay.....	12,000,000*	12,125,000	7,811,000	6,519,000
Total South America.....	234,000,000	189,179,000	200,629,000	174,834,000
<i>Australasia—</i>				
Australia.....	124,200,000	132,285,000	106,637,000	90,500,000
New Zealand.....	8,000,000*	10,500,000	5,978,000	7,070,000
Total Australasia.....	132,200,000	142,785,000	112,615,000	97,570,000
World's Total.....	3,029,868,000	3,037,682,000	2,759,724,000	2,923,178,000

*Figures in the first column followed by an asterisk are unofficial, being based on acreage and condition reports.

THE AGRICULTURAL GAZETTE OF CANADA

TABLE II—DIFFERENCES IN WHEAT PRODUCTION IN EUROPE BETWEEN THE CROPS OF
1922 AND 1921

Countries	Increase (+) or decrease (—) from 1921
	Bushels
Great Britain and Ireland.....	— 9,795,000
France.....	— 88,090,000
Germany.....	— 38,134,000
Belgium.....	— 4,625,000
Netherlands.....	— 3,476,000
Denmark.....	— 4,744,000
Norway.....	— 424,000
Sweden.....	— 4,099,000
Finland.....	— 104,000
Spain.....	— 19,248,000
Portugal.....	— 3,013,000
Italy.....	— 30,431,000
Switzerland.....	— 1,713,000
Luxemburg.....	— 151,000
Poland.....	+ 7,384,000
Czecho-Slovakia.....	— 8,210,000
Austria.....	— 852,000
Hungary.....	— 8,764,000
Jugo-Slavia.....	+ 9,000,000
Roumania.....	— 9,000,000
Bulgaria.....	— 8,167,000
Greece.....	— 1,617,000
Total.....	+228,293,000

France, Germany, Italy and Spain exhibit decreases which amount to about 175,000,000 bushels. To the decrease in Germany of 38,000,000 bushels of wheat must be added a further decrease of 57,000,000 bushels of rye, in all a deficiency of 95,000,000 bushels of bread grains. Poland's big crop of rye, showing an increase over the preceding one of 43,000,000 bushels, will no doubt find in Germany a ready nearby market for its surplus. Hungary, Czecho-Slovakia and Bulgaria, which in the past have exported wheat, show

this year each a deficiency of about 8 million bushels, or together, a total of 25 million. Denmark, Belgium and Sweden, each a little over four million short, have a total shortage of 13,468,000. Netherlands and Portugal together 6,489,000; Jugo-Slavia, Switzerland, Greece and Roumania 6,600,000. To the total wheat shortage in Europe of 228,293,000 bushels has to be added a total shortage of 51,000,000 bushels of rye, aggregating a deficiency of 279 million bushels of bread grains.

TABLE III

RYE

Countries	1922	1921	Average 1916-20
	Bushels	Bushels	Bushels
Germany.....	210,580,000	267,651,000	217,210,00
Belgium.....	18,598,000	21,273,000	9,742,000
Bulgaria.....	8,761,000	8,390,000	6,056,000
Spain.....	27,340,000	28,118,000	26,911,000
Finland.....	8,114,000	10,385,000	9,422,000
France.....	37,600,000	44,392,000	32,535,000
Greece.....	2,362,000	3,151,000	1,241,000
Hungary.....	22,374,000	23,177,000	20,564,000
Italy.....	5,019,000	5,624,000	4,829,000
Latvia.....	7,823,000	9,806,000	4,686,000
Netherlands.....	12,388,000	16,646,000	13,096,000
Poland.....	210,199,000	167,559,000	73,660,000
Roumania.....	7,874,000	9,081,000	9,445,000
Sweden.....	21,034,000	27,812,000	20,039,000
Switzerland.....	1,693,000	1,559,000	1,664,000
Czecho-Slovakia.....	45,799,000	53,735,000	32,942,000
Canada.....	49,602,000	21,455,000	7,350,000
United States.....	79,623,000	57,918,000	67,773,000
Totals.....	776,783,000	777,742,000	559,165,000
Totals for Europe.....	647,558,000	698,369,000	484,042,000

THE AGRICULTURAL GAZETTE OF CANADA

Speaking of Europe, Poland had an increase of 43,000,000 bushels, nearly three times the average production of the period 1916-20. There is the notable decrease of 57,000,000 bushels in Germany, which has to be added to the 38,000,000 bushels shortage in wheat. Excepting Bulgaria and Switzerland, whose production is practically the same as last year, there is a decrease in all the other European countries. That decrease was nearly 7,000,000 in France, over 57,000,000 in Germany and 8,000,000 in Czecho-Slovakia. Notwithstanding the big increase in Poland, there is a total decrease in Europe, so far as official figures are now available, of 51,000,000 bushels. When the rest of the data are available, it is not improbable that the total decrease will reach a figure between 75,000,000 and 100,000,000 bushels. Still, referring to available figures, the present production is 163,000,000 bushels greater than the average of 1916-20. So that, if

there be added to the European deficiency in wheat of 228,000,000 bushels the further deficiency of 51,000,000 in rye, there appears in the total bread grains a decrease of 279,000,000 bushels. On the other hand the short crop of Europe is evenly balanced by the increase of 50,000,000 bushels in North America. Of this increase nearly 22,000,000 bushels is credited to the United States and 28,000,000 bushels to Canada. In fact the total Canadian rye production, more than twice last year's figures, if used exclusively for human food would suffice for Canada's total bread consumption. Henceforth, the importance of this fact must not be overlooked in estimating the quantity of wheat used for home consumption. The European eats on the average one bushel of rye for every two of wheat, although the per capita consumption varies by a wide margin between the maximum and minimum consuming countries.

TABLE IV

BARLEY

Countries	1922	1921	Average 1916-20
	Bushels	Bushels	Bushels
Belgium.....	3,991,000	5,117,000	3,900,000
Bulgaria.....	12,061,000	13,241,000	9,451,000
Spain.....	74,795,000	89,321,000	85,518,000
Finland.....	4,637,000	4,939,000	4,771,000
England and Wales.....	42,583,000	44,242,000	47,675,000
Hungary.....	21,428,000	21,408,000	22,586,000
Italy.....	7,946,000	10,362,000	8,283,000
Latvia.....	6,980,000	6,496,000	3,054,000
Netherlands.....	2,541,000	3,651,000	2,452,000
Poland.....	63,417,000	56,205,000	38,567,000
Roumania.....	87,267,000	45,254,000	67,606,000
Sweden.....	12,415,000	12,326,000	12,070,000
Switzerland.....	482,000	552,000	637,000
Czecho-Slovakia.....	42,145,000	47,472,000	37,238,000
Canada.....	76,396,000	59,709,000	58,962,000
United States.....	196,431,000	151,181,000	197,443,000
Japan.....	85,849,000	87,883,000	93,648,000
Algeria.....	19,805,000	48,226,000	36,772,000
Egypt.....	11,306,000	11,941,000	11,433,000
Morocco.....	22,506,000	29,510,000	33,093,000
Tunis.....	1,837,000	11,482,000	6,788,000
Totals.....	796,818,000	760,518,000	781,947,000
Totals for Europe.....	382,688,000	360,586,000	343,808,000

In Europe the decreases in Spain and Czecho-Slovakia, 14,526,000 and 5,327,000 bushels respectively, are more than counter-balanced by the increase of 42,013,000 and 7,212,000 in Roumania and Poland. Against the total increase for Europe of 22,102,000

bushels there appears a decrease of 45,070,000⁰ bushels in Algeria, Morocco and Tunis. Canada and the United States together have increased their production by 61,937,000 bushels, and the world's total has increased 36,300,000 bushels.

THE AGRICULTURAL GAZETTE OF CANADA

TABLE V

OATS

Countries	1922	1921	Average 1916-20
	Bushels	Bushels	Bushels
Belgium.....	25,937,000	33,153,000	21,076,000
Bulgaria.....	10,797,000	10,609,000	6,592,000
Spain.....	32,871,000	33,521,000	31,320,000
Finland.....	26,962,000	26,380,000	22,898,000
England and Wales.....	85,800,000	92,068,000	106,040,000
Hungary.....	21,196,000	20,672,000	20,995,000
Italy.....	28,142,000	35,553,000	30,915,000
Latvia.....	16,746,000	15,852,000	6,444,000
Netherlands.....	15,463,000	20,036,000	19,966,000
Poland.....	172,547,000	141,448,000	121,471,000
Roumania.....	71,326,000	62,454,000	64,329,000
Sweden.....	68,233,000	72,093,000	65,412,000
Switzerland.....	2,321,000	2,857,000	3,653,000
Czecho-Slovakia.....	60,724,000	69,730,000	56,145,000
Canada.....	558,358,000	426,232,000	432,926,000
United States.....	1,229,774,000	1,060,737,000	1,329,518,000
Japan.....	12,644,000	11,375,000	7,317,000
Algeria.....	5,242,000	9,726,000	13,347,000
Tunis.....	908,000	3,891,000	2,886,000
Totals.....	2,445,991,000	2,148,387,000	2,363,250,000
Totals for Europe.....	639,065,000	636,426,000	577,256,000

Here against an increase of 2,639,000 bushels in Europe there is a decrease of 7,467,000 bushels in Algeria and Tunis. The increases of 31,099,000 for Poland and 8,872,000 for Roumania a little more than counterbalance the decreases in the other European countries. The world's total, of the countries reported, shows an increase of 297,604,000 bushels; only a little less than the increase of 301,000,000 of the oat crops of Canada and the United States.

It is to be noted further that the total for the countries here reported shows an increase of 82,741,000 bushels over the

average of the period 1916-1920. Naturally, German figures not being yet available, make a material difference, as it is expected to exhibit a big decrease in all grains.

REQUIREMENTS AND SUPPLIES OF WHEAT

Proceeding to estimates of the world's needs and supplies wherewith to meet them, the following statement of requirements has been recently published by the "Corn Trade News" and deserves the closest attention:

Countries	Crops 1921	Imports 1921-22	Crop 1922	Estimated imports 1922-23
	Bushels	Bushels	Bushels	Bushels
Great Britain and Ireland.....	73,795,000	208,000,000	64,000,000	224,000,000
France.....	323,470,000	16,800,000	235,380,000	56,000,000
Germany.....	107,800,000	69,600,000	69,666,000	80,000,000
Belgium.....	14,495,000	36,000,000	9,870,000	40,000,000
Netherlands.....	8,686,000	20,000,000	5,210,000	24,000,000
Italy.....	192,838,000	100,000,000	162,407,000	112,000,000
Spain.....	145,151,000	9,600,000	125,908,000	16,000,000
Portugal.....	8,613,000	1,600,000	5,600,000	4,000,000
Denmark.....	11,144,000	4,000,000	6,400,000	5,600,000
Sweden.....	12,577,000	3,600,000	8,473,000	8,000,000
Norway.....	972,000	4,800,000	548,000	5,600,000
Switzerland.....	5,284,000	12,800,000	3,517,000	16,000,000
Austria.....	6,452,000	20,000,000	5,600,000	20,000,000
Finland.....	280,000	2,400,000	176,000	2,400,000
Poland.....	37,410,000	1,200,000	44,794,000	.....
Czecho-Slovakia.....	38,682,000	10,400,000	50,472,000	16,000,000
Greece.....	11,170,000	12,000,000	9,553,000	12,000,000
Total Europe.....	998,819,000	532,800,000	787,628,000	641,600,000
Ex-Europe.....	.....	100,000,000	.....	64,000,000
Grand Total.....	.....	632,800,000	.....	705,600,000

THE AGRICULTURAL GAZETTE OF CANADA

To cover European needs, which from decrease of production would seem to require an importation of 228,000,000 bushels greater than last grain year, Mr. Broomhall in this table forecasts an importation only 109,000,000 bushels greater. In view of the financial difficulties to be overcome and the rationing measures resorted to it is not unreasonable to expect, as he does, that consumption will be reduced by 122,000,000 bushels. We cannot, however, follow Mr. Broomhall in his reduction of the imports outside of Europe from 100,000,000 bushels actual imports last year to 64,000,000 bushels this year. From the fact that the recorded imports were last year 632,000,000 whereas the recorded exports were 678,000,000, it seems probable that the imports outside of

Europe were more than 100,000,000 bushels. That is, there must have been imports over the 100,000,000 actually recorded that escaped the statisticians' notice.

Russia and India which imported last year about 16,000,000 bushels each can this year at least provide for their own needs. Africa, on the other hand, is this year short 32,000,000 bushels and must import liberally. We believe the actual imports of Ex-Europe will rather approximate 80,000,000 bushels, which would bring the grand total of requirements to 721,000,000 bushels.

Against these requirements the supplies that may be estimated from data available at the present date are presented in the following table:

Countries	Carry-over August 1st, 1922	Crop 1922	Probable Exports 1922-23	Estimated Carry-over August 1st, 1923
	Bushels	Bushels	Bushels	Bushels
United States.....	60,715,000	810,000,000	220,000,000	30,000,000
Canada.....	34,000,000	388,000,000	265,000,000	32,000,000
Argentina.....	35,000,000	200,000,000	110,000,000	20,000,000
Australia.....		125,000,000	75,000,000	15,000,000
India.....		366,000,000	25,000,000	16,000,000
Poland.....		45,000,000	5,000,000	
Manchuria.....			10,000,000	
Roumania.....		87,000,000	10,000,000	
			720,000,000	113,000,000

The exports are given in the following table by months and countries for the grain year August 1st, 1921, to July 31st, 1922. The figures for August and September 1922 are also added in so far as available:

Months	Canada	United States	India	Australia	Argentina	Totals five countries
1921-22	Bushels	Bushels	Bushels	Bushels	Bushels	Bushels
August.....	6,013,000	66,963,000	220,000	5,304,000	1,983,000	80,263,000
September.....	8,770,000	38,950,000	(imp. 229,000)	5,293,000	1,289,000	54,302,000
October.....	24,097,000	25,366,000	(imp. 571,000)	10,056,000	954,000	60,473,000
November.....	33,106,000	19,453,000	(imp. 2,739,000)	9,991,000	637,000	63,187,000
December.....	37,856,000	15,014,000	(imp. 4,427,000)	7,859,000	3,040,000	63,769,000
January.....	8,946,000	14,982,000	(imp. 3,586,000)	13,644,000		52,386,000
February.....	8,595,000	10,991,000	(imp. 3,214,000)	14,570,000		48,969,000
March.....	10,481,000	14,370,000	(imp. 1,089,000)	15,194,000	20,013,000	60,058,000
April.....	4,045,000	10,244,000		13,118,000	14,257,000	41,664,000
May.....	16,985,000	14,267,000		9,683,000	14,243,000	55,178,000
June.....	15,201,000	18,200,000		5,900,000	12,600,000	51,901,000
July.....	11,674,000	19,098,000		3,100,000	12,900,000	46,772,000
Total for grain year 1921-22.....	185,769,000	267,898,000		113,712,000	111,543,000	678,922,000
August.....	14,247,000	38,966,000		2,800,000	9,300,000	
September.....	12,372,000			1,800,000	4,800,000	

The adverse exchange conditions have been much stressed as barriers to European imports to the full extent of requirements. For the chief countries, outside of Germany that argument does not hold.

The following examples will illustrate. On August 25th last the price of a bushel of No. 1 Manitoba wheat on the Winnipeg

market equalled 4s. 11d. in English money at the rate of exchange on that day. On August 26th, 1921, the cost in English money at the then rate of exchange was 8s. 11d. The corresponding figures for other European countries were: France 21.3 francs against 29.8 francs; Italy 35.7 liras against 54.9 liras; Germany 2,867 marks against 196

marks. It is known, however, that Germany is able through exports to produce sufficient credits to import all the wheat she needs. Last year, in spite of the rapidly falling value of the mark she imported nearly 70 million bushels, which is more than the pre-war average importation, and the exact amount which we forecasted in November 1921.

In conclusion—exporting countries on August 1st last found stocks in Europe comparatively depleted, the total supply small, and old stocks in the exporting countries more than ordinarily reduced. The latter condition is strikingly true in Australia and Argentina. By mid September Australia had no more wheat, and Argentina had only a remaining surplus of 22 million bushels. Neither of these countries can get their new crops on the European market in great volume before mid February. It is true that the Argentine, with a substantially increased acreage and good weather, forecasts a large crop, but the Australian prospects are only fair. India also with fair future prospects may be able to spare from 25 to 30 million bushels by August 1st next. With the European demand unusually large the biggest buying countries there acting

under comparatively favourable prices and exchange conditions, North America has almost exclusive control of the market for the next three or four months. The Balkans, which last year only exported about 5 million bushels, will probably have very little more to spare, and the prospective exports of Poland and Manchuria are a negligible factor, while those of India, pretty evenly distributed throughout the grain year, cannot exercise a great influence. If provision is to be made in August next for carry-over equal to that of August of this year the world's supplies, presently and prospectively available, will probably not more than meet the demand. In November last year our forecast of the world's imports was 636 million bushels; Broomhall recently published detailed figures showing an actual import of 632 million, and the exports which we then figured at 648 million bushels and recently placed at that same figure by Mr. Broomhall amount, according to other official statistics, to 678 million bushels. For the current year with a European shortage of 231 million, it is reasonable to expect the total actually marketed imports to reach 720 million bushels, as shown by the above table, and the export figures exceed them usually by at least 20 million bushels.

NOTES ON FOREIGN CROP CONDITIONS

(October 23, 1922)

United Kingdom.—Variable weather was experienced during the first part of October. Large quantities of grain were still lying out in the fields in some parts of the country. The quality of wheat is generally fair.

France.—The weather improved during the first week of October and work on the land was proceeding satisfactorily.

Germany.—Better weather was experienced lately which enabled the farmers to complete the harvest. Sowing of winter grain, which was everywhere in arrears, is proceeding more rapidly.

Italy.—Fine warm weather has been followed by much rain which should favour the new seedlings.

North Africa.—The prevailing hot, dry weather has brought ploughing and sowing in Algeria practically to a standstill.

China.—Reports indicate a 70 per cent crop of wheat. The rice crop is expected to be below average, although somewhat better than that of last year.

Manchuria.—A heavy crop of wheat is reported to have been raised this year.

Korea.—The 1922 harvest is likely to be inferior to that of last year.

India.—All restrictions on the importation of wheat from British India were removed, effective September 29th, Trade Commissioner Batchelder cabled the British Department of Commerce from Calcutta. Mr. Batchelder further states that the international price has become firmer and that it is expected exports will be made principally to England, the available surplus being estimated at 6,000,000 to 8,000,000 bushels.

According to a cablegram received from Rome on October 23rd there have been prolonged monsoon rains in India and sowing was proceeding favourably.

Argentina.—The wheat area is estimated at 17,200,000 acres against 13,927,000 last year. Crops are reported to be in excellent condition and a large yield of wheat is expected.

Australia.—Lately splendid rains fell in Victoria and South Australia, but rain is needed in New South Wales. The first official estimate of this year's wheat crop places it at 124,200,000 bushels against 132,285,000 last year. This indicates an exportable surplus of about 75,000,000 bushels. The area sown to wheat for the coming crop is unofficially estimated at 10,500,000 acres against 9,445,000 in 1921-22.

THE AGRICULTURAL GAZETTE OF CANADA

CABLED REPORT FROM THE INTERNATIONAL INSTITUTE

According to a cablegram received on October 23rd from the International Institute of Agriculture sowing is proceeding favourably in India where there have been prolonged monsoon rains. Progress in agricultural work has been normal in Italy,

Hungary and Yugoslavia. In England, France, and Czecho-Slovakia work was greatly retarded during September on account of wet weather but better progress was general in October.

UNITED STATES OCTOBER CROP REPORT

The October crop report of the United States Department of Agriculture cuts the corn crop 22 millions under the September 1st estimate but leaves it 23 million bushels above the 5-year final estimate. In 11 surplus States there are apparently 17,100,000 less than at September 1st, but Iowa

shows 9 millions more, while Illinois and Nebraska lost about 13,000,000 bushels each during the month.

Spring wheat shrank 8,351,000 bushels since the September estimate, but the total crop is about 15 millions above last year's final estimate. Details follow:

Crops	October 1st, 1922 forecast	Final estimate 1921
Winter wheat, bushels.....	541,809,000	587,032,000
Spring wheat, bushels.....	268,314,000	207,861,000
All Wheat, bushels.....	810,123,000	794,893,000
Corn, bushels.....	2,853,399,000	3,080,372,000
Oats, bushels.....	1,229,774,000	1,060,737,000
Barley, bushels.....	196,431,000	151,181,000
Rye, bushels.....	79,623,000	57,918,000
Buckwheat, bushels.....	14,051,000	14,079,000
White potatoes, bushels.....	433,015,000	346,823,000
Sweet potatoes, bushels.....	105,490,000	98,660,000
Flaxseed, bushels.....	11,725,000	8,112,000
Cotton, bales.....	10,135,000	7,954,000
Hay, tame, tons.....	92,886,000	81,567,000
Hay, wild, tons.....	15,850,000	15,235,000
Sugar beets, tons.....	5,070,000	7,782,000
Grain sorghums, bushels.....	95,840,000	115,110,000
Peanuts, lbs.....	674,478,000	816,465,000
Beans, bushels.....	13,013,000	9,118,000

LIVE STOCK STATISTICS

FRANCE

Classification	Numbers on		Increase (+) or decrease (-)	
	31 December, 1921	31 December, 1920	in number	per cent
Horses.....	2,706,110	2,635,350	+ 70,760	+ 2.7
Mules.....	186,420	180,600	+ 5,820	+ 3.2
Asses.....	295,780	298,180	- 2,400	- 0.8
Cattle.....	13,343,440	13,217,240	+126,200	+ 1.0
Sheep.....	9,599,560	9,405,870	+193,690	+ 2.1
Pigs.....	5,166,080	4,941,460	+224,620	+ 4.5
Goats.....	1,361,180	1,340,890	+20,290	+ 1.5

THE AGRICULTURAL GAZETTE OF CANADA

ENGLAND AND WALES

Classification	Numbers on		Increase (+) or (-) decrease	
	3 June, 1922	3 June, 1921	in number	per cent
Horses.....	1,340,000	1,384,000	- 44,300	- 3.2
Cattle.....	5,721,800	5,516,700	+205,100	+ 3.7
Sheep.....	13,436,700	13,831,500	-394,000	- 2.9
Pigs.....	2,296,700	2,505,500	-208,800	- 8.3

LATVIA

Classification	Number on		Increase (+) or decrease (-)	
	June, 1922	1921	in number	per cent
Horses.....	303,000	282,500	+ 20,500	+ 7.3
Cattle.....	810,500	799,500	+ 11,000	+ 1.4
Sheep.....	1,161,500	1,132,000	+ 29,500	+ 2.6
Pigs.....	402,000	482,000	- 80,000	-16.6

TUNIS

Classification	Numbers in		Increase (+) or decrease (-)	
	1921	1920	in number	per cent
Horses.....	74,245	74,249	-4	
Asses and mules.....	174,351	193,875	- 19,524	-10.1
Camels.....	132,196	140,762	- 8,566	- 6.1
Oxen.....	488,348	537,088	- 48,740	- 9.1
Sheep.....	2,037,551	2,182,749	-145,198	- 6.7
Goats.....	1,113,845	1,285,047	-171,202	-13.3
Pigs.....	17,636	18,699	- 1,063	- 5.7

NEW ZEALAND

Classification	Number on		Increase (+) or decrease (-)	
	31 January, 1921	31 January, 1920	in number	per cent
Horses.....	331,855	337,259	- 5,404	- 1.6
Cattle.....	3,273,126	3,139,223	+ 133,903	+ 4.3
Sheep (a).....	22,245,473	23,285,031	-1,039,558	- 4.5
Pigs.....	380,026	349,892	+ 30,134	+ 8.6

(a) Number on April 30th of year indicated.

THE AGRICULTURAL GAZETTE OF CANADA

INDEX TO VOLUME IX

Agricultural Appropriations and Legislation, Dominion of Canada, 1922.....	383, 384
Agricultural Appropriations and Legislation, 1922:	
Quebec.....	227
New Brunswick.....	307
Saskatchewan.....	309
Alberta.....	311
Manitoba.....	313
Ontario.....	398
Nova Scotia.....	399
British Columbia.....	400
Prince Edward Island.....	401
Agricultural Education:	
in Ontario.....	126
Rural Science in Nova Scotia.....	216
New Brunswick, Elementary.....	304
Saskatchewan, Progress of Elementary.....	412
Elementary (British Columbia).....	490
Agricultural Instruction Act:	
(Summary of Activities 1913-22)	
Ontario's Work under the.....	26
in Quebec.....	101
Macdonald College.....	108
in Nova Scotia.....	211
in Manitoba, The.....	219
New Brunswick's Activities under the.....	301
in Saskatchewan.....	388
in Alberta.....	391
British Columbia.....	485
Prince Edward Island.....	496
Agricultural Instruction Grant, 1922-23:	
Ontario.....	384
Quebec.....	385
Manitoba.....	385
Saskatchewan.....	386
Alberta.....	386
British Columbia.....	386
Nova Scotia.....	386
New Brunswick.....	387
Prince Edward Island.....	387
Agricultural Instruction in Elementary Schools—Saskatchewan, Manitoba, Ontario.....	518
Agricultural College Enrolment, 1921-22.....	47
Agricultural Merit Day in Quebec.....	505
Agricultural Merit Award.....	506
Agricultural Production of Canada in 1921.....	148
Agricultural Statistics in Canada, Annual.....	145
Agricultural Winter Fair Association of Canada, Royal.....	153
Agriculture, Graduate Study in.....	467
Appointments and Staff Changes.....	54, 159, 331, 431, 532
Apples originated at the Central Experimental Farm, New Varieties of.....	96
Apple Sucker Quarantine in Nova Scotia, Amendment to The.....	243
Appropriations and Legislation, Dominion of Canada 1922, Agricultural.....	383, 384
Appropriations and Legislation, 1922:	
Quebec.....	227
New Brunswick.....	307
Saskatchewan.....	309
Alberta.....	311
Manitoba.....	313
Ontario.....	398
Nova Scotia.....	399
British Columbia.....	400
Prince Edward Island.....	401

THE AGRICULTURAL GAZETTE OF CANADA

Associations and Societies:

Alberta Aberdeen-Angus Breeders' Association.....	333
Alberta Cattle Breeders' Association.....	248
Alberta Clydesdale Horse Breeders' Association.....	333
Alberta Hereford Breeders' Association.....	248
Alberta Horse Breeders' Association.....	333
Alberta Provincial Poultry Association.....	248
Alberta Shorthorn Breeders' Association.....	333
Alberta Swine Breeders' Association.....	333
Alberta Technical Agriculturists' Association.....	333
British Columbia Ayrshire Breeders' Association.....	248
British Columbia Dairymen's Association.....	248
British Columbia Entomological Society.....	248
British Columbia Fruit Growers' Association.....	156
British Columbia Goat Breeders' Association.....	248
British Columbia Poultry Association.....	157
British Columbia Stock Breeders' Association.....	333
Canadian Aberdeen-Angus Association.....	247
Canadian Ayrshire Breeders' Association.....	247
Canadian Co-operative Wool Growers' Association.....	247
Canadian Guernsey Breeders.....	157
Canadian Hackney Horse Society.....	247
Canadian Hereford Breeders' Association.....	247
Canadian Horticultural Council.....	333
Canadian Jersey Cattle Club.....	247
Canadian Pony Society.....	247
Canadian Seed Growers' Association.....	433
Canadian Sheep Breeders' Association.....	158
Canadian Shire Horse Association.....	247
Canadian Society of Technical Agriculturists.....	434
Canadian Swine Breeders' Association.....	247
Central Canada Veterinary Association.....	156
Clydesdale Horse Association of Canada.....	247
Conference of Dairy Produce Graders.....	54
Conference of Ontario Agricultural Representatives.....	435
Dairymen's Association of Eastern Ontario.....	156
Dairymen's Association of Western Ontario.....	156
Dominion Shorthorn Breeders' Association.....	158
Dual-Purpose Shorthorn Association.....	247
Eastern Canada Live Stock Union.....	435
Field Husbandry Association, Saskatchewan.....	158
Holstein-Friesian Association of Canada.....	247
Manitoba Dairy Association.....	158
Manitoba Live Stock Association.....	157
Manitoba Poultry Breeders' Association.....	248
Maritime Beekeepers' Association.....	157
Maritime Live Stock Conference.....	432
Maritime Poultry Association.....	157
National Dairy Council.....	157
New Brunswick Beekeepers' Association.....	248
New Brunswick Farmers' and Dairymen's Association and New Brunswick Dairymen United.....	157
New Brunswick Fruit Growers' Association.....	248
Niagara District Grape Growers Limited.....	248
Niagara Peninsula Fruit Growers, Limited.....	156
Niagara Peninsula Growers, Limited.....	248
Nova Scotia Dairymen's Association.....	156
Nova Scotia Farmers' Association.....	157
Nova Scotia Fruit Growers' Association.....	156
Nova Scotia Poultry Association.....	248
Ontario Bee-Keepers.....	54
Ontario Berkshire Breeders' Society.....	247
Ontario Cattle Breeders' Association.....	247
Ontario Co-operative Dairy Products, Limited.....	436
Ontario Corn Growers' Association.....	247
Ontario Experimental Union.....	157
Ontario Horse Breeders' Association.....	247

THE AGRICULTURAL GAZETTE OF CANADA

Associations and Societies:

Ontario Horticultural Society.....	158
Ontario Poultry Association.....	54
Ontario Poultry Producers' Association.....	334
Ontario Seed Growers' Association.....	247
Ontario Sheep Breeders' Association.....	247
Ontario Swine Breeders' Association.....	158
Ontario Vegetable Growers' Association.....	158
Quebec Pomological and Fruit Growing Society.....	54
Royal Agricultural Winter Fair.....	334
Saskatchewan Ayrshire Breeders' Club.....	248
Saskatchewan Belgian Horse Club.....	159
Saskatchewan Cattle Breeders' Association.....	159
Saskatchewan Clydesdale Breeders' Association.....	159
Saskatchewan Hereford Breeders' Association.....	159
Saskatchewan Holstein Breeders' Club.....	248
Saskatchewan Horse Breeders' Association.....	159
Saskatchewan Sheep Breeders' Association.....	159
Saskatchewan Shorthorn Breeders' Club.....	159
Saskatchewan Swine Breeders' Association.....	159
Thoroughbred Horse Society.....	247
Western Canada Irrigation Association.....	436
Western Plant Quarantine Board.....	436
Yorkshire Breeders' Club.....	247
"Availability" in Plant Foods.....	236
Bees no Longer May be Imported from Europe.....	326
Better Farming Trains, 1922, Saskatchewan.....	402
Quebec.....	507
Birds, Canada's.....	238
Protect the.....	324
Boys' Camps, Saskatchewan, Short Courses and.....	403
Bull, Alberta Purchases Fine.....	405
Butter Scoring Contest, 1921, The Dominion—Final Results.....	99
Educational.....	210
Butter, Whey.....	120
Canadian Fruit and Vegetables, the Marketing of.....	481
Cap Rouge Experimental Station, The.....	476
Club Week in Manitoba, Girls'.....	514
Clubs Alberta Women's Institute Girls'.....	34
Congress of Quebec Women's.....	508
Women's in the Province of Quebec.....	392
Community Work in Dundas County, Ontario, Illustration.....	283
Competitions Conducted by Junior Ontario Farmers, Profit, 1921.....	222
1921, Field Crop.....	228
Co-operative Marketing of Pure Seed, The.....	373
Association, The O.A.C. Students'.....	235
Corn: Its History Production and Utilization—European Corn Borer, The.....	83
Borer, The European.....	83
in Southern Ontario, The European.....	22
Course, Ontario, Household Science Degree.....	414
Courses and Boys' Camps, Saskatchewan, Short.....	403
in Agriculture, Nova Scotia, Summer.....	401
and Domestic Science, Three-Month (Ontario).....	314
Cow Testing 1921, Report of.....	279
and Its Value.....	378
Dairy Produce, Conference on the Grading of.....	208
Products, Production and Value.....	528
Dairying at the Oka Agricultural Institute.....	498
Destructive Insect and Pest Act, Amendments to the Regulations Under The.....	240
Dominion Educational Butter Scoring Contest, 1921—Final Results.....	99
1922, The.....	210
Dominion Experimental Farms Branch Its History and Development, The.....	5
Dominion Experimental Farm Series, The :	
Prince Edward Island Experimental Station, The.....	87
Kentville, N.S. Experimental Station, The.....	187
Brandon Experimental Station, The.....	275
Lethbridge, Alberta, The Experimental Station.....	369
Cap Rouge Experimental Station, The.....	476

THE AGRICULTURAL GAZETTE OF CANADA

Education, Agricultural:	
in Ontario.....	126
Rural Science in Nova Scotia.....	216
New Brunswick, Elementary.....	304
Saskatchewan, Progress of Elementary.....	412
Elementary (British Columbia).....	493
Egg-Laying, Lessons Gained from Contests.....	376
Egg Production, A Method of Judging Fowls for.....	423
Experimental Farms Branch Its History and Development, The Dominion.....	5
Experimental Farms Series, The Dominion:	
Prince Edward Island Experimental Station, The.....	87
Kentville, N.S. Experimental Station, The.....	187
Brandon Experimental Station, The.....	275
Lethbridge, Alberta, The Experimental Station.....	369
Cap Rouge Experimental Station, The.....	476
Export Fee For Foxes.....	326
Extension Service and Farm Bureaus, Michigan State.....	508
Farm Bureau Exchanges (Michigan State).....	512
and Its Branches (Michigan State).....	510
Farm Bureaus, Michigan State, Extension Service and.....	508
Fertilizers Act, 1922, The.....	380
Fertilizer Administration, Commercial.....	25
Field Crop Competitions, 1921:	
Ontario.....	228
Saskatchewan.....	228
Alberta.....	229
"Field Days" in Saskatchewan.....	516
Finch Dairy Station, The Enlargement of the.....	207
Forest Protection and Tree Planting.....	49
Foxes, Export Fee for.....	326
Fruit Conference, The Sixth Dominion.....	208
Fruit Growing in Canada, Commercial.....	195
Fruit Show, 1922, The Imperial.....	387
Fruit Storage Warehouse, The Grimsby Pre-cooling and Experimental.....	206
Girls' Club Week in Manitoba.....	514
Institutes of Ontario, The.....	229
Grading of Pure Bred Rams—Nova Scotia.....	37
Grimsby Pre-cooling and Experimental Fruit Storage Warehouse, The.....	206
High School Poultry Project, A.....	410
Household Science Degree Course, Ontario.....	414
Illustration Community Work in Dundas County, Ont.....	283
Impression From a Trip Through the State of Michigan.....	513
Institutes in Ontario, The Origin, Activities and Possibilities of Women's.....	30
of Ontario, The Girls.....	229
International Seed Control Congress, The.....	21
Judging Fowls for Egg Production, A Method of.....	423
Junior Ontario Farmers, 1921, Profit Competitions Conducted by.....	222
Kentville, N.S., The Experimental Station.....	187
Legislation, Dominion of Canada, 1922, Agricultural Appropriations and.....	383
Legislation, 1922, Agricultural Appropriations and:	
Quebec.....	227
New Brunswick.....	307
Saskatchewan.....	309
Alberta.....	311
Manitoba.....	313
Ontario.....	398
Nova Scotia.....	399
British Columbia.....	400
Prince Edward Island.....	401
in Canada, The Application of Seed.....	295
Lethbridge, Alberta, The Experimental Station.....	369
Library, The.....	55, 160, 349, 334, 438, 533
Maple Sap Products, Investigation of.....	35
Marketing of Canadian Fruit and Vegetables, The.....	481
Pure Seed, The Co-operative.....	373
Plan for Alberta, A Seed Grain.....	517
Meat and Canned Foods Inspection Service, The.....	479

THE AGRICULTURAL GAZETTE OF CANADA

Michigan, Impressions From a Trip Through the State of.....	513
Michigan State, Extension Service and Farm Bureaus.....	508
Farm Bureau Exchanges.....	512
and Its Branches.....	510
Milk, The Dietary Value of.....	198
Minister of Agriculture, Honourable W. R. Motherwell.....	25
Mosquito Breeding Places, An Aerial Survey of.....	191
Motherwell, Minister of Agriculture, The Honourable W. R.....	25
News Items and Notes.....	50, 154, 244, 326, 425, 529
New Publications.....	57, 163, 248, 332, 437, 536
New Varieties of Apples Originated at the Central Experimental Farm.....	96
Nitro-Cultures and Their Distribution.....	14
Oka Agricultural Institute, Dairying at the.....	498
Ontario Veterinary College, The.....	393
Plant Foods, "Availability" in.....	236
Potato Certification in B.C., Progress of Seed.....	122
Inspection and Certification.....	202
Poultry Disease Research.....	19
Project, A High School.....	410
Prince Edward Island Experimental Station, The.....	87
Production of Canada in 1921, Agricultural.....	148
Rams, Nova Scotia, Grading of Pure Bred.....	37
Regulations Under the Destructive Insect and Pest Act, Amendments to the.....	240
Regulations for Wool, Hair, Hides, etc., Import.....	243
Reindeer Industry, The.....	93
Research, Poultry Disease.....	19
Royal Agricultural Winter Fair Association of Canada.....	153
Rural Life and Activities for Women.....	315
Rural Science in Nova Scotia Schools.....	216
Science School, Truro, N.S.....	413
Credits in Canada.....	321
Credit Systems, Ontario.....	141
Rye Grass, Western.....	205
School Exhibition—When and Where, The.....	132
Fairs, 1921, School and Home Projects and.....	41
Fairs and Home Garden Contests—Ontario—1922.....	232
Truro, N.S., Rural Science.....	413
The Prince Edward Island Agricultural and Technical.....	408
in the Rural Community, The.....	38, 127
Gardens and Home Gardens.....	318
Garden, Where? The.....	320
Schools of Agriculture and Domestic Science for Ontario.....	45
Rural Science in Nova Scotia.....	216
Science, Veterinary Sanitary.....	415
Seed Control Congress, The International.....	21
The Co-operative Marketing of Pure.....	373
Grain Marketing Plan for Alberta, A.....	517
Grain Purchasing Commission, The.....	205
Potato Certification in B.C., Progress of.....	122
Production in Alberta.....	298
Sheep Improvement Measures in Ontario.....	37
Short Courses and Boys' Camps, Saskatchewan.....	403
Staff Changes, Appointments and.....	25, 54, 159, 331, 431, 532
Statistics in Canada, Annual Agricultural.....	145
Stock Foods, Composition of.....	209
Summer Courses in Agriculture, Nova Scotia.....	401
Summer-Fallow Substitutes.....	115
Survey of Mosquito Breeding Places, An Aerial.....	191
Survey, The Manitoba Agricultural.....	305
Swine Policy, A National.....	18
Tree Planting, Forest Protection and.....	49
Planting on Prairie School Grounds.....	406
University of British Columbia, Faculty of Agriculture.....	493
Veterinary Sanitary Science.....	415
Vitamin, Pasteurization Process and Its Effect on the.....	524
Western Rye Grass.....	205
Whey Butter.....	120

THE AGRICULTURAL GAZETTE OF CANADA

Women, Rural Life and Activities for.....	315
Women's Clubs, Congress of Quebec.....	508
Clubs in the Province of Quebec.....	392
Institutes in Ontario, The Origin, Activities and Possibilities of.....	30

INDEX TO SOURCE

Graduate Study in Agriculture, by Dr. F. C. Harrison; Dr. L. S. Klinck; President J. B. Reynolds; Ex-President John Bracken; Dean Howes, and Dean Rutherford..	467
--	-----

PART I

DOMINION DEPARTMENT OF AGRICULTURE

Agricultural Instruction Grant, 1922-23:	
Ontario.....	384
Quebec.....	385
Manitoba.....	385
Saskatchewan.....	386
Alberta.....	386
British Columbia.....	386
Nova Scotia.....	386
New Brunswick.....	387
Prince Edward Island.....	387
Agricultural Legislation and Appropriations, 1922.....	383, 384
Corn: Its History, Production and Utilization, by J. H. Grisdale, B.Agr., D.A.Sc., Deputy Minister of Agriculture for Canada.....	83
Minister of Agriculture, Honourable W. R. Motherwell.....	25

DOMINION EXPERIMENTAL FARMS BRANCH

Dominion Experimental Farms Branch its History and Development, The.....	5
Experimental Farm, The Brandon, by W. C. McKillican, Superintendent.....	275
Experimental Station, The Cap Rouge, by Gus. Langelier, Superintendent.....	476
Experimental Station, Kentville, N.S., The, by W. S. Blair, Superintendent.....	187
Experimental Station, Lethbridge, Alberta, The, by W. H. Fairfield, Superintendent....	369
Experimental Station, The Prince Edward Island, by J. A. Clark, B.S.A., Superintendent.	87
Division, The Botany:	
Nitro-Cultures and Their Distribution, by A. Inglis, B.A., Junior Botanist, Central Experimental Farm.....	14
Potato Inspection and Certification, by George Partridge, Central Experimental Farm.....	202
Division of Extension and Publicity:	
Community Work in Dundas County, Ontario, Illustration, by F. C. Nunnick, B.S.A., Chief.....	283
Division of Forage Plants:	
Rye Grass, Western.....	205
Division of Horticulture:	
Apples Originated at the Central Experimental Farm, New Varieties of, by W. T. Macoun, Dominion Horticulturist.....	96
Division, The Poultry:	
Egg-Laying Contests, Lessons Gained From, by F. C. Elford, Dominion Poultry Husbandman.....	376

DAIRY AND COLD STORAGE BRANCH

Butter Scoring Contest, 1921—Final Results, The Dominion Educational, by George H. Barr, Chief, Dairy Division.....	99
Butter Scoring Contest for 1922, The Dominion Educational.....	210
Cow-Testing, 1921, Report of, by A. H. White, Chief Dairy Promoter.....	279
Cow-Testing and Its Value, by A. H. White, Senior Dairy Promoter.....	378
Dairy Produce, Conference on the Grading of.....	208
Finch Dairy Station, The Enlargement of the.....	207
Fruit Storage Warehouse, The Grimsby.....	206
Milk, The Dietary Value of, by Miss Helen G. Campbell.....	198

THE AGRICULTURAL GAZETTE OF CANADA

THE ENTOMOLOGICAL BRANCH

Corn Borer in Southern Ontario, The European, by Leonard S. McLaine, Division of Foreign Pests Suppression.....	22
Mosquito Breeding Places, An Aerial Survey of, by Eric Hearle.....	191

THE FRUIT BRANCH

Fruit Conference, The Sixth Dominion.....	208
Fruit Growing in Canada, Commercial, by C. W. Baxter, Commissioner.....	195
Fruit Show, 1922, The Imperial.....	387
Marketing of Canadian Fruit and Vegetables, The, by G. E. McIntosh, Commissioner..	481

THE HEALTH OF ANIMALS BRANCH

Meat and Canned Foods Inspection Service, The, by Robt. Barnes, V.S.....	479
Reindeer Industry, The, by E. A. Watson, Capt. C.A.V.C., Chief Animal Pathologist...	93
Research, Poultry Disease, by A. B. Wickware, V.S., Animal Pathologist.....	19

THE LIVE STOCK BRANCH

Swine Policy, A National.....	18
-------------------------------	----

THE SEED BRANCH

Fertilizer Administration, Commercial.....	25
Fertilizers Act 1922, The, by G. S. Peart, B.S.A., Chief of Markets and Fertilizer Division.....	380
Seed Control Congress, The International, by George H. Clark, B.S.A., Commissioner..	21
Seed, The Co-operative Marketing of Pure, by George H. Clark, B.S.A., Commissioner..	373
Seed Grain Purchasing Commission, The.....	205
Seed Legislation in Canada, The Application of, by C. Sweet, Chief, Seed Division.....	295
Seed Production in Alberta, by G. M. Stewart, District Inspector.....	298
Stock Foods, Composition of.....	209

PART II

PROVINCIAL DEPARTMENTS OF AGRICULTURE

PRINCE EDWARD ISLAND

Agricultural Instruction Work in P.E.I., Résumé of.....	496
Legislation and Appropriations, 1922, Provincial Agricultural.....	401

NOVA SCOTIA

Agricultural Instruction in Nova Scotia, by Dr. M. Cumming, Secretary for Agriculture..	211
Courses in Agriculture, Summer.....	401
Legislation and Appropriations, 1922, Provincial Agricultural.....	399
School., Rural Science in Nova Scotia, by L. A. DeWolfe, M.Sc., Director.....	216
Rams, Grading of Pure Bred.....	37

NEW BRUNSWICK

Agricultural Instruction Act, New Brunswick's Activities Under the, by O. C. Hicks, B.S.A.....	301
Legislation, 1922, Agricultural.....	307

QUEBEC

Agricultural Instruction in Quebec.....	101
Macdonald College.....	108
Agricultural Merit Day in Quebec.....	505
Agricultural Merit Award.....	506
Better Farming Train in the Province of Quebec.....	507

THE AGRICULTURAL GAZETTE OF CANADA

Clubs, The Congress of Quebec Women's.....	508
Clubs in the Province of Quebec, Women's.....	392
Dairying at the Oka Agricultural Institute, by Rev. Br. Isidore.....	498
Legislation, 1922, Provincial.....	227
Maple Sap Products, Investigation of, by J. F. Snell, Professor of Chemistry, Macdonald College.....	35

ONTARIO

Agricultural Instruction Act, Ontario's Work Under the, by W. Bert Roadhouse, Deputy Minister of Agriculture.....	26
Butter, Whey, by H. H. Dean, B.S.A., Professor of Dairying, Ontario Agricultural College.....	120
Competitions Conducted by Junior Ontario Farmers, 1921, Profit, by W. D. Jackson, B.S.A., Assistant Director of Agricultural Representatives.....	222
Competitions, 1921, Field Crop.....	228
Institutes in Ontario, The Origin, Activities and Possibilities of Women's, by Geo. A. Putnam, Superintendent.....	30
Institutes of Ontario, The Girls', by Emily J. Guest, M.A.....	229
Legislation and Appropriations, 1922, Provincial.....	398
Sheep Improvement Measures in Ontario.....	37
Veterinary College, The Ontario, by C. D. McGilvray, V.S., M.D.V., Principal.....	393

MANITOBA

Agricultural Appropriations.....	313
Agricultural Instruction Act in Manitoba, The, by Jas. H. Evans, Deputy Minister of Agriculture.....	219
Agricultural Survey, The Manitoba.....	305
Girls' Club Week in Manitoba, by S. T. Newton.....	514

SASKATCHEWAN

Agricultural Instruction Grant in Saskatchewan, The.....	388
Better Farming Trains, 1922, Saskatchewan.....	402
Boys' Camps, Saskatchewan, Short Courses and, by J. G. Rayner, Director, Extension Department, University of Saskatchewan.....	403
Competitions, 1921, Field Crop.....	228
"Field Days" in Saskatchewan.....	516
Legislation, 1922, Agricultural.....	309
Summer-Fallow Substitutes, by Manley Champlin, M.S., Sr. Professor of Field Husbandry.....	115

ALBERTA

Agricultural Instruction in Alberta.....	395
Bull, Alberta Purchases Fine.....	401
Clubs, Alberta Women's Institute Girls'.....	34
Competitions, 1921, Field Crop.....	229
Legislation, 1922, Agricultural.....	311
Seed Grain Marketing Plan for Alberta, A.....	517

BRITISH COLUMBIA

Agricultural Instruction Grant in British Columbia, Summary of Activities, 1913-22—	
I. The Department of Agriculture.....	485
II. Elementary Agricultural Education.....	490
III. University of British Columbia, Faculty of Agriculture.....	493
Legislation and Appropriations, 1922, Agricultural.....	400
Potato Certification in British Columbia, Progress of Seed, by C. Tice, Officer in Charge.....	122

PART III

SCHOOL AGRICULTURE AND RELATED ACTIVITIES

Agricultural College Enrolment, 1921-22.....	47
Agricultural Instruction in the Elementary Schools—Saskatchewan, Manitoba, Ontario..	518
School Exhibition—When and Where, The.....	132
School in the Rural Community, The, by G. V. Van Tausk, M.A., B.Ss. (Oxon), B.S.A.....	38, 127
School Fairs, 1921, School and Home Projects and School.....	41

THE AGRICULTURAL GAZETTE OF CANADA

PRINCE EDWARD ISLAND

School, The Prince Edward Island Agricultural and Technical, by Vernon Crockett, Principal.....	408
---	-----

NOVA SCOTIA

School Exhibition—When and Where, The, by L. A. Dewolfe, B.A., M.Sc., Director Rural Science.....	138
School Fairs, 1921, School and Home Projects and, by L. A. Dewolfe, B.A., M.Sc.....	42
School, Rural Science, Truro, N.S.....	413

NEW BRUNSWICK

School Exhibition—When and Where, The, by A. C. Gorham, M.Sc., Director of Elementary Agricultural Education.....	139
School Fairs, 1921, School and Home Projects and, by A. C. Gorham, M.Sc.....	43

ONTARIO

Agricultural Education in Ontario, by Dr. J. B. Dandeno, Inspector of Agricultural Classes.....	126
Agricultural Instruction in the Elementary Schools, by Dr. J. B. Dandeno.....	521
Co-operative Association, The O.A.C. Students', by H. C. Mason, B.S.A.....	235
Household Science Degree Course, Ontario.....	414
School Exhibition—When and Where, The, by Dr. J. B. Dandeno.....	134
School Fairs, 1921, School and Home Projects and, by Dr. J. B. Dandeno.....	41
School Fairs and Home Garden Contests—Ontario—1922, by R. S. Duncan, B.S.A., Director, Agricultural Representative Branch.....	232
Schools of Agriculture and Domestic Science for Ontario, by L. Stevenson, B.S.A., Secretary and Supervising Director, Department of Agriculture.....	45

MANITOBA

Agricultural Instruction in the Elementary Schools, by R. G. Vaughan, Director of Technical Education.....	520
School Exhibition—When and Where, The, by S. T. Newton, Director, Agricultural Extension Service.....	135

SASKATCHEWAN

Agricultural Instruction in the Elementary Schools, by F. W. Bates, B.A., M.Sc., Director School Agriculture.....	518
Clubs, Saskatchewan Boys' and Girls', by Harry Saville, B.S.A., Organizer of Boys' and Girls' Clubs.....	44
Education in Saskatchewan, Progress of Elementary Agricultural, by F. W. Bates, B.A., M.Sc.....	412
School and Home Gardens, by G. V. Van Tausk, M.A., B.Sc. (Oxon), B.S.A.....	318
School Exhibition—When and Where, The, by Fred W. Bates, B.A., M.Sc.....	136
School Exhibitions, Saskatchewan, by Fred W. Bates, B.A., M.Sc.....	43
School Garden, Where? The, by Fred W. Bates, B.A., M.Sc.....	320
School in the Rural Community, The, by G. V. Van Tausk, M.A., B.Sc. (Oxon), B.S.A.....	38
Tree Planting on Prairie School Grounds, by Norman M. Ross, Chief of Tree Planting Division, Department of the Interior.....	406
Women, Rural Life and Activities for, by Miss Abbie DeLury, Director, Home-Makers' Department, University of Saskatchewan.....	315

ALBERTA

School Fairs, Alberta.....	44
----------------------------	----

BRITISH COLUMBIA

Poultry Project, A High School, by Jean Thompson, High School, Chilliwack, B.C....	410
School Exhibition—When and Where, The, by J. W. Gibson, Director of Elementary Agricultural Education.....	133

THE AGRICULTURAL GAZETTE OF CANADA

PART IV

SPECIAL CONTRIBUTIONS, REPORTS OF AGRICULTURAL ORGANIZATIONS PUBLICATIONS AND NOTES

Apple Sucker Quarantine in Nova Scotia, Amendment to the.....	243
Appointments and Staff Changes.....	54, 159, 331, 431, 532
Associations and Societies.....	54, 156, 247, 333, 432
Bees May No Longer Be Imported from Europe.....	326
Birds, Canada's, by Harrison F. Lewis, Chief Federal Migratory Bird Officer for Ontario and Quebec.....	238
Birds, Protect the, by L. Stevenson, B.S.A.....	324
Dairy Products, Production and Value.....	528
Egg Production, A Method of Judging Fowls for.....	423
Foxes, Export Fee For.....	326
Library, The.....	55, 160, 249, 334, 438, 533
News Items and Notes.....	50, 154, 244, 326, 425, 529
New Publications.....	57, 163, 248, 335, 437, 536
Plant Foods, "Availability" in, by Dr. A. McGill, Dominion Analyst, Department of Health.....	236
Production of Canada in 1921, Agricultural, by Ernest H. Godfrey, F.S.S., Chief, Agricultural Division, Dominion Bureau of Statistics, Ottawa.....	148
Regulations Under the Destructive Insect and Pest Act, Amendments to the, by L. S. McLaine, Chief, Division of Foreign Pests Suppression, Entomological Branch....	240
Regulations for Wool, Hair, Hides, Etc., Import....	243
Rural Credits in Canada.....	321
Rural Credit Systems, Ontario.....	141
Statistics in Canada, Annual Agricultural, by Ernest H. Godfrey, F.S.S.....	145
Tree Planting, Forest Protection and.....	49
Veterinary Sanitary Science, by Duncan McEachran, LL. D., F.R.C.V.S., V.S., Edinburgh, D.V.S. McGill.....	415
Vitamin Content of Milk, The Pasteurization Process and Its Effect on the, by A. Bruce Macallum, M.D., Ph.D.....	524
Winter Fair Association of Canada, Royal Agricultural, by C. F. Bailey, Managing Director.....	153

PART V

INDEX TO FOREIGN AGRICULTURAL INTELLIGENCE

Airplanes, Fighting Insects with.....	549
Alfalfa on Subsequent Yields of Irrigated Crops, Influence of.....	166
Alkali in Soils.....	59
<i>Apanteles Melanoscelus</i> , An Imported Parasite of the Gipsy Moth.....	549
Apple Nursery Stock, Leaf Hoppers Injurious to.....	69
Basic Slag, The Physical Chemistry of.....	337
Beekeeping in Isolated Hives.....	63
Botany, Agricultural:	
Investigations on the Hardening Process in Vegetable Plants.....	539
Breeding of Live Stock:	
Value of the Purebred Sire in Increasing the Production of a Scrub Herd.....	258
<i>Bromus brachyantheca</i> , A Brazilian Winter Forage Plant.....	544
Carbon Dioxide:	
Of the Soil Air.....	446
Fertilizing Action of.....	539
Carbonic Acid Gas as a Fertilizer.....	59
Cattle:	
Rearing Calves on Milk Substitutes.....	259
Herd Books of French Breeds of Cattle.....	342
The Licking Habit, Its Causes and Cure.....	544
Chloropicrin on the Germinating Power of Seed, Action of.....	254
Cider, Non-Alcoholic.....	546
Clover:	
Wild White Clover in Seed Mixtures.....	170
Seed Production in Red Clover.....	543
"Clumine" as a Fertilizer.....	59

THE AGRICULTURAL GAZETTE OF CANADA

Cold:	
Influence of Cold in Stimulating the Growth of Plants.....	167
Low Temperatures for Retarding Growth in Flowers.....	171
Cold Storage of Fruits.....	347
Copper Aceto-Arsenite in Tablets as an Insecticide.....	350
Crescograph: an Aparatus for Studying the Growth of Plants.....	60
Crop Statistics.....	72, 177, 267, 360, 458, 554
Cyanamide in the Soil, Mechanism of the Decomposition of.....	449
Damage to Crops by Weather in the United States.....	165
Economics, International Review of Agricultural.....	71, 176, 266, 352, 457, 552
Electricity:	
Electrification of Seeds by the Wolfryn Process.....	169
Fallow vs. Stable Manure.....	538
Feeds and Feeding:	
Sunflower Silage.....	256
Purdue Calf Meal as a Milk Substitute in Calf Feeding.....	258
Rearing Calves on Milk Substitutes.....	259
Stover vs. Maize Silage for Milk Production.....	259
Experiments on Feeding Concentrates.....	343
Hair and other Epithelial Products Fed to Wool-Producing Sheep.....	344
Correlation between the Size and the Digestibility of a Ration.....	452
The Potato as a Stock Feed.....	453
Fertilizers: See Manures and Manuring.	
Flag Smut Injurious to Wheat.....	348
Flax and Flaxseed:	
First International Trial of Mechanical Flax Pullers.....	64
Manuring Experiment and Seed Trials in Ireland.....	257
Floriculture, Low Temperature for Retarding Growth in.....	171
Forestry:	
Artificial Production of Vigorous Trees by Hybridization.....	168
Douglas Fir Attacked by <i>Phomopsis Pseudotsugae</i>	262
Gases:	
Effect on Insects.....	70
Toxic Action on Insects.....	263
Goats' Milk, Biochemical and Biological Qualities of.....	347
Grapes, Commercial Fertilizers for.....	62
Grasshopper Baits, Experiments with.....	70
Hay, Toxic Products of New.....	545
Honey, The Potting of.....	66
Horse, Creation of an American Utility.....	342
Hygiene of Live Stock:	
Inoculating Cattle Against Tuberculosis.....	172
Value of Arsenical Dips as Remedies against Scab.....	341
The Licking Habit in Cattle.....	544
Insects, Injurious:	
Leaf-Hoppers Injurious to Apple Nursery Stock.....	69
Selection of Food Plants by Lepidopterous Larvae.....	69
Experiments with Grasshopper Baits.....	70
The White Pine Aphid in Massachusetts.....	70
Effect of Deleterious Gases on Insects.....	70
Toxic Action of Gases on Insects.....	263
Copper Aceto-Arsenite in Tablets as an Insecticide.....	350
Fighting Insects with Airplanes.....	549
<i>Apanteles Melanoscelus</i> , an Imported Parasite of the Gipsy Moth.....	549
<i>Stilpnolia Salicis</i> , Injurious to Poplars and Willows.....	550
Experiments with Contact Dust.....	550
Larkspurs, Chemical Examination of.....	62
Lime: Its Effect on the Availability of Soil Potassium, Phosphorus and Sulphur.....	538
Live Stock Statistics:	
Spain.....	76
New Zealand.....	76
Scotland.....	77
Ireland.....	77
The World's Live Stock.....	179
Austria.....	269
Greece.....	269
Esthonia.....	269
Switzerland.....	362

THE AGRICULTURAL GAZETTE OF CANADA

Netherlands.....	362
France.....	561
England and Wales.....	562
Tunis.....	562
Latvia.....	562
New Zealand.....	562
Locusts, International Convention at Rome for the Control of.....	173
Machinery and Implements:	
First International Trial of Mechanical Flax Pullers.....	64
Utilization of Automobile Engines.....	260
Combined Dodder and Plantain Seed Eliminator and Threshing Machine.....	344
The "Pax" Sprayer.....	345
The "Mav" Cultivator for Rocky Land.....	345
Reciprocating Butter-Worker.....	346
The Maskell Junior Motor Plough.....	546
Manures and Manuring:	
Effect of "Clumine" as a Fertilizer.....	59
Commercial Fertilizers for Grapes.....	62
The Fertilizer Situation in the United States.....	165
Phosphoric Acid in Sandy Humiferous Soils.....	166
Manuring Tobacco.....	254
The Physical Chemistry of Basic Slag.....	337
The Fertilizing Action of Sulphur.....	338
Critical Study of Pot Fertilizer Experiments.....	338
Artificial Farmyard Manure.....	447
Effect of Straw on the Biological Soil Processes.....	448
Influence of Fertilizers upon the Productivity of the Soil.....	448
The Mechanism of the Decomposition of Cyanamide in the Soil.....	449
Effects of Liming on the Availability of Soil Potassium, Phosphorus and Sulphur.....	538
Influence of Fallow vs. Stable Manure.....	538
Fertilizing Action of Carbon Dioxide.....	539
Fertilizers in Relation to Crop Production.....	539
Meat:	
Frozen Meat Industry in Brazil.....	347
Meat of Tuberculous Cattle from the Hygienic Standpoint.....	445
Meteorology, Agricultural:	
Damage to Crops in the United States by Weather.....	165
Development in the United States.....	252
Weather Forecast and Agriculture.....	445
Influence of Drought on the Growth of Plants.....	446
Milk and Milking:	
Payment of Milk according to Its Fat Content.....	172
Method for Detection of Abnormal Milks.....	261
Cost of Production.....	346
Biochemical and Biological Qualities of Goats' Milk.....	347
Pasteurization of Milk in Bottles.....	455
The Oxyhydriase of Milk.....	548
Dried Milks.....	548
Oats, Early Varieties of.....	170
Onion Smut.....	263
Pasteurization of Milk in Bottles.....	455
Phytopathological Services:	
Uruguay.....	261
Italy.....	348
Plant Breeding:	
"Ardito" Wheat Obtained by Hybridization in Italy.....	60
Improvement of Sugar Beets by Selection in France.....	60
Crossing the Raspberry with the Salmonberry in Alaska.....	255
Intensity of the Green Colour as a New Factor in Wheat Selection.....	540
Rust Resistance in Winter Wheat Varieties.....	540
Potatoes:	
Production, Cultivation and Marketing.....	62
Cutting Tubers for Planting.....	62
Freezing Injury to Undercooled Potatoes.....	66
Temperature and Humidity Studies of Fusaria Rots.....	67
Influence of Size and Character of Seed on Yield.....	256
Wart Disease.....	262
Improvement by Hill Selection.....	449

THE AGRICULTURAL GAZETTE OF CANADA

Treatment of Potato Sets and Arguments for and Against Planting Whole.....	450
Use of the Potato as a Stock Feed and Source of Alcohol, and the Manufacture of Potato Products.....	453
Poultry in Fruit Plantations.....	259
Research and the Farmer, Agricultural.....	442
Rural Economics:	
Cost of Producing Wheat.....	65
Payment of Milk According to its Fat Content.....	172
Cost of Milk Production.....	346
Rye Grass for Grassland.....	170
Sacks, Preservation of Canvas.....	261
Seeds:	
Electrification by the Wolfryn Process.....	169
Methods of Differentiating between the Seed of Mangolds and Sugar Beets.....	170
Action of Chloropicrin on Germination Power.....	254
Seed Production in Red Clover.....	543
Sheep, Hair and other Epithelial Products Fed to Wool-Producing.....	344
Silage:	
A Cheap and Convenient Silo.....	63
Quality of Silage Produced in Barrels.....	63
Influence of Fermentation on the Starch Content of Silage.....	173
Sunflower Silage.....	256
Stover vs. Maize Silage for Milk Production.....	259
Nitrogen and other Losses during the Ensiling of Maize.....	453
The Sunflower as a Silage Crop.....	545
Soils:	
Alkali in.....	59
Analysis of.....	447
Statistics, International Yearbook of Agricultural.....	442
<i>Stilpnotia salicis</i> , Injurious to Poplars and Willows.....	550
Straw on the Biological Soil Processes, Effect of.....	448
Sugar Beets: Improvement by Selection in France.....	60
Sulphur, Fertilizing Action of.....	338
Sunflower:	
Cultivation and Use as Silage.....	256
As a Silage Crop.....	545
Tea, Production and Trade.....	340
Tobacco, Manuring.....	254
Tomatoes:	
Resistance to <i>Macrosporium tomato</i>	66
<i>Macrosporium solani</i> , Injurious to.....	67
<i>Bacterium exitiosum</i> n.sp., Injurious to.....	349
<i>Phytophthora</i> sp. and <i>Septoria lycopersici</i> on Tomato Seedlings.....	548
Uruguay, Phytopathological Services of.....	261
Vine, in Italy During the Last Fifty Years, The Cultivation of the.....	341
Vitamines:	
Food Rations and Vitamines.....	337
Are Vitamines Necessary for the Growth of Plants?.....	339
Wheat:	
"Ardito" Wheat Obtained by Hybridization in Italy.....	60
Cost of Producing.....	65
Self Sown Wheat in Relation to the Spread of Rust.....	68
The Nitrogenous Matter and Phosphoric Acid Present During the Maturation and Germination of Wheat.....	167
Early Varieties.....	170
The 1921 Wheat Crop in Great Britain.....	172
The Take-All Disease of Wheat.....	174
Inheritance of Resistance to Bunt.....	255
Changes Taking Place in the Temperature of Wheat for Milling.....	260
The French National Wheat Committee.....	340
Flag Smut Injurious to Wheat.....	348
World's Wheat Prospects for 1922-23.....	353
World's Production of Wheat.....	459
Rust Resistance in Winter Wheat Varieties.....	540
Comparison Studies of the Resistance to Lodging of Pure Bred Wheat Varieties....	541
Methods of Winter Wheat Production.....	543
Wine, Non-Alcoholic.....	546
World's Wheat Requirements and Supplies.....	554

AN INVESTMENT that Increases in Value the longer it is Held.

AN INVESTMENT you can Realize upon immediately, without loss.

AN INVESTMENT that will yield $5\frac{1}{2}\%$ Interest, compounded half-yearly.

AN INVESTMENT that is backed by All the Resources of Canada.

is offered you in

Dominion of Canada Savings Certificates

Denominations to suit every Investor

\$5

\$10

\$25

\$50

\$100

Obtainable at the following Prices:

\$4.25 \$8.50 \$21.25 \$42.50 \$85.00

at any Bank or Money Order Post Office

“INVEST TO-DAY!”

“SAVE BEFORE YOU SPEND !!”

Issued by The Finance Department, Ottawa

Indian Agricultural Research Institute (Pusa)
LIBRARY, NEW DELHI-110012

This book can be issued on or before

Return Date	Return Date